DRAFT OF

# ENVIRONMENTAL STATEMENT HUNTINGTON CANYON GENERATING STATION AND TRANSMISSION LINE



September 17, 1971

PREPARED BY

DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
Bureau of Land Management
Bureau of Sport Fisheries and Wildlife

DEPARTMENT OF AGRICULTURE
Forest Service

DEPARTMENT OF TRANSPORTATION
Federal Highway Administration

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SUMMARY

September 17, 1971

DRAFT ENVIRONMENTAL STATEMENT
HUNTINGTON CANYON GENERATING STATION
AND TRANSMISSION LINE

Prepared By:

Department of the Interior
Bureau of Reclamation, Region 4, Salt Lake City, Utah
Bureau of Land Management, Utah State Office, Salt Lake City, Utah
Bureau of Sport Fisheries and Wildlife, Albuquerque, New Mexico

Department of Agriculture
Forest Service, Ogden, Utah

Department of Transportation
Federal Highway Administration, Salt Lake City, Utah

1. Administrative action.

2. The Utah Power & Light Company, Salt Lake City, Utah, is constructing a thermal-electric generating station in Emery County, Utah, approximately 29 miles by road southwest of Price, Utah. The generating station will burn coal from an underground mine about 2½ miles from the station, to be operated by Peabody Coal Company. The first 430 mw unit is scheduled to go on line in 1974, and present load growth projections by Utah Power & Light Company indicate that the second unit will be needed by 1978. This generating station may ultimately have an installed capacity of 2,000 mw.

Energy from the first generating unit will be transmitted principally over a 345 kv line to Camp Williams near Salt Lake City, Utah, and to the Four Corners Area, where it will interconnect with the

Arizona Public Service Company system. This line was energized on June 26, 1971, as a part of the Utah Power & Light Company interconnected system. Additional transmission capacity will be needed as more generating units are installed.

A 30,000 acre-foot reservoir on Huntington Creek will be required as a part of the cooling water supply system for the station. The United States, acting through the Department of the Interior, Bureau of Reclamation, is considering a contract with Utah Power & Light Company and Emery Water Conservancy District for sale of water to provide a part of the required supply. The proposed contract will require the Company to comply with all applicable Federal, State, and local laws, orders, and regulations relating to air and water quality control, as well as requiring control of other environmental aspects. Designs and plans for water and air quality control equipment are subject to review by the Secretary of the Interior under the proposed contract.

The other Federal agencies listed above have jurisdiction over lands that will be affected by the generating station, the coal mine, the dam and reservoir, the relocation of Forest Highway Route 7, and the transmission line, or have responsibilities related to the construction and operation and maintenance of some or all of these facilities. This draft of Environmental Statement has been prepared to meet the responsibilities of all of the listed agencies under the National Environmental Policy Act (P. L. 91-190).

3. Environmental impact and effects.

a. Stack emissions.--These include 33-45 tons of $SO_2$ per day (without removal equipment), 36 tons $NO_x$ as $NO_2$ per day, and 0.9 to 1.4 tons per day of fly ash with 99.5% removal efficiency for a 430 mw unit at full load. Meteorological and modeling studies indicate that current Federal and State of Utah air quality standards will not be exceeded for the 430 mw unit. As additional units are added, the Utah Power & Light Company is committed to continued compliance with Federal and State air quality standards.

b. Disposal of an estimated 80,000 tons of ash produced annually for a 430 mw unit.--Ash deposits will be covered with earth, and a vegetative cover established.

c. Noise of generating station operation.--The generating station is being designed to meet requirements of the Walsh-Healy Act, and the best technology will be used in noise attenuation.

d. Aesthetic impact of generating station, transmission line, road relocation, dam and reservoir, and coal mining and conveyance.--Facilities have been planned and designed to complement and blend with natural surroundings.

e. Dust from coal and ash handling.--Covered live storage coal pile, closed conveyors, and water sprays will be used to control dust.

f. Possible radionuclide release from coal burning.--Preliminary studies indicate ambient concentrations will be only a fraction of U. S. Public Health standards for air.

g. Some destruction of stream fishing, but enhancement of reservoir fishing.--Loss of big game wintering lands, which will be mitigated to some degree by acquisition of other lands and range improvement. Recreational resources will be enhanced overall.

h. Concern expressed about possible cumulative impacts on air quality of emissions from the Huntington Canyon Generating Station in combination with other generating stations in the Southwest prompted a joint meteorological report prepared for the participants in the generating stations by their consulting meteorologists. The report is referenced in the Environmental Statement and is presently being reviewed by meteorologists of the Bureau of Reclamation, TVA, EPA, and NOAA. Comments are being sought from a broad base of Federal, State, and non-Governmental interests. This meteorological report will be distributed with the consolidated Environmental Statement on the Navajo Project due for wide circulation and review soon.

4. Alternatives considered.

a. Alternative locations.

b. Several smaller plants.

c. Curtailment of use of electrical energy.

d. Substitute fuels--nuclear, oil, gas, gasification of coal.

e. Geothermal resources.

5. A list of Federal, State, and local agencies, and organizations and individuals from which comments have been requested on this draft Environmental Statement is attached.

MAILING LIST FOR DRAFT ENVIRONMENTAL STATEMENT

HUNTINGTON CANYON GENERATING STATION AND TRANSMISSION LINE

September 17, 1971

## Federal Agencies

1. Dr. T. C. Byerly, Assistant Director of Science and Education, Office of the Secretary, Department of Agriculture, Washington, D. C. 20250

2. Mr. Joseph J. DiNunno, Director, Office of Environmental Affairs, U. S. Atomic Energy Commission, Washington, D. C. 20545

3. Mr. Charles Fabrikant, Director of Impact Statements Office, Environmental Protection Agency, 1626 K Street, N.W., Room 911, Washington, D. C. 20460

4. Mr. Frederick H. Warren, Commission's Advisor on Environmental Quality, Federal Power Commission, Washington, D. C. 20426

5. Mr. Roger O. Egeberg, Assistant Secretary for Health and Science Affairs, Department of Health, Education, and Welfare, HEW North Building, Washington, D. C. 20202

6. Mr. Robert H. Baida, Regional Administrator IX, Department of Housing and Urban Development, Attn: Environmental Clearance Office, P. O. Box 36003, San Francisco, California 94102 (450 Golden Gate Avenue)

7. Dr. Francis Gartrell, Director of Environmental Research and Development, 720 Edney Building, Tennessee Valley Authority, Chattanooga, Tennessee 37401

8. Hon. Michael S. Cafferty, Assistant Secretary for Environment and Urban Systems, Department of Transportation, Washington, D. C. 20590

9. Mr. Paul DeFalco, Regional Director, S.W. Region, Environmental Protection Agency, San Francisco, California 94102

10. Dr. Sydney R. Galler, Deputy Assistant Secretary for Environmental Affairs, Department of Commerce, Washington, D. C. 20230

11. Mr. Ralph Gibson, Federal Highway Administration, Room 2432-A, Federal Office Building, Salt Lake City, Utah 84111

12. Mr. Max Nielson, Bureau of Land Management, Room 8239, Federal Office Building, Salt Lake City, Utah 84111

13. Mr. Robert Scott, Bureau of Sport Fisheries & Wildlife, Room 2225, Federal Office Building, Salt Lake City, Utah 84111

14. Mr. W. H. Boley, Forest Supervisor, Manti-La Sal National Forest, Price, Utah 84501

15. Mr. Hugh Pangman, Forest Service, Department of Agriculture, Federal Office Building, 324-25th Street, Ogden, Utah 84401

16. Mr. G. O. Wessenauer, TVA, 850 Power Building, Chattanooga, Tennessee 37401

17. Lawrence D. Gazda, Environmental Protection Agency, 9017 Federal Office Building, 19th & Stout Street, Denver, Colorado 80202

18. Soil Conservation Service, Walker Bank Building, Price, Utah 84501 Attn: Mr. Scott Passey

19. Hon. Russell E. Train, Chairman, Council on Environmental Quality, 722 Jackson Place, N. W., Washington, D. C. 20006

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1. Commissioner, Fish and Wildlife Service, Washington, D. C.
2. Director, Bureau of Sport Fisheries and Wildlife, Washington, D. C.
3. Director, National Park Service, Washington, D. C.
4. Director, Bureau of Land Management, Washington, D. C.
5. Commissioner, Bureau of Indian Affairs, Washington, D. C.
6. Director, Bureau of Outdoor Recreation, Washington, D. C.
7. Director, Geological Survey, Washington, D. C.
8. Director, Bureau of Mines, Washington, D. C.
9. Regional Solicitor, Salt Lake City, Utah 84111
10. Secretary's Field Representative, Pacific Southwest Field Committee, P. O. Box 36098, San Francisco, California 94102
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State, County, and Local Entities

1. Mr. Kenneth Olson, Planning Coordinator, Governor's Office, State Capitol, Salt Lake City, Utah 84114

2. Mr. Henry Helland, Director, Utah Highway Department, State Capitol, Salt Lake City, Utah 84114

3. Mr. Daniel F. Lawrence, Director, Division of Water Resources, Department of Natural Resources, 435 State Capitol, Salt Lake City, Utah 84114

4. Mr. Gordon B. Harmston, Utah Department of Natural Resources, State Capitol Building, Salt Lake City, Utah 84114

5. Mr. James G. Christensen, Division of Water Resources for Utah, 435 State Capitol, Salt Lake City, Utah 84114

6. Mr. Joseph Francis, Chairman, State Department of Agriculture, State Capitol, Salt Lake City, Utah 84114

7. Dr. Grant S. Winn, Chief, Air Quality Section, Utah State Division of Health, 44 Medical Drive, Salt Lake City, Utah 84113

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15. Mr. Myron B. Holburt, Chief Engineer, State of California, Colorado River Board of California, 302 California State Building, 2117 West 1st Street, Los Angeles, California 90012

16. Mr. Joseph Palomba, Jr., Chief, Air Pollution Control, State of Colorado Department of Health, 4210 East 11th Avenue, Denver, Colorado 80220

17. Mr. Fred Matter, P.E., Supervising P. H. Engineer, State of Colorado Department of Health, 4210 East 11th Avenue, Denver, Colorado

18. Mr. Wesley E. Steiner, Arizona Interstate Stream Commission, 34 West Monroe Street, Suite 707, Phoenix, Arizona 85003

19. Mr. Omar Bunnell, Utah State Senator, 640 North 3rd East, Price, Utah 84501

20. Mr. John Garr, State Representative, Carbon County, 151 Denver Avenue, Dragerton, Utah 84520

21. Mr. Mike Dimitrich, State Representative, Carbon County, 735 North 6th East, Price, Utah 84501

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23. Mr. Kenneth Stillman, State Representative, Grand & Emery Counties, Box 365, Green River, Utah 84525

24. Mr. C. Alfred Frost, State Representative, Monticello, Utah 84535

25. County Commissioners, Grand County, Moab, Utah 84532

26. County Commissioners, Emery County, Castle Dale, Utah 84513

27. County Commissioners, Carbon County, Price, Utah 84501

28. County Commissioners, San Juan County, Monticello, Utah 84535

29. County Commissioners, Kane County, Kanab, Utah 84741

30. County Commissioners, Garfield County, Panguitch, Utah 84759

31. County Commissioners, San Pete County, Manti, Utah 84642

32. Mr. Clyde Conover, Water and Power Board, Ferron, Utah 84523

33. Mr. H. A. Brownfield, Board of Big Game Control, 335 East 1st North, Price, Utah 84501

34. Mr. Robert L. Herbst, Commissioner of Natural Resources, State of Minnesota, Centennial Building, 658 Cedar, St. Paul, Minnesota 55101

## Conservation and Environmental Groups

1. Mr. Thomas L. Kimball, Executive Director, National Wildlife Federation, 1412 Sixteenth St., N.W., Washington, D. C. 20036

2. Mr. William E. Towell, Executive Vice President, The American Forestry Association, 919-17th Street, N.W., Washington, D. C. 20006

3. Mr. Daniel A. Poole, President, Wildlife Management Institute, 709 Wire Building, Washington, D. C. 20005

4. Mr. James B. Ruch, Field Representative, Southwest Region, 4929 Paloma Avenue, Carmichael, California 95608

5. Friends of the Earth, 451 Pacific, San Francisco, California 94133

6. Mrs. Janet M. Stake, Librarian, Sierra Club, 1050 Mills Tower, San Francisco, California 94104

7. Mr. Bud Sullivan, Utah Wildlife & Outdoor Recreation Federation, 1102 Walker Bank Building, Salt Lake City, Utah 84101

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9. League of Women Voters, Mrs. Patrick J. Brennan, 1218 South 1300 East, Salt Lake City, Utah 84105

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14. Mr. Clifton Merritt, President, Wilderness Society of America, 5850 East Jewell Avenue, Denver, Colorado 80222

15. Mr. Morey Wolfsen, Director, Environmental Action Committee, 1100-14th Street, Denver, Colorado 80202

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18. Mr. Thomas H. Noble, The Central Clearing House, 107 Cienga Street, Santa Fe, New Mexico 87501

19. Mr. John A. McComb, Sierra Club Southwest Office, 2014 East Broadway, Room 216, Tucson, Arizona 85719

20. Native American Rights Fund, 1506 Broadway, Boulder, Colorado 80302, Attn: Messrs. James Vollintine & Peter J. Aschenbrenner

21. Mr. N. A. Winter, Jr., Regional Director, National Wildlife Federation, 2507 East Indian School Road, Phoenix, Arizona 85016

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2. Mr. R. N. Coe, Chairman, Environmental Committee, Western Systems Coordinating Council, c/o Southern California Edison, P. O. Box 351, Los Angeles, California 90053

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2. Mr. William P. Hewitt, Director, Utah Geological Survey, University of Utah, Salt Lake City, Utah 84112

3. Dr. George R. Hill, Dean, College of Mines & Mineral Industries, University of Utah 84112

4. Prof. Wm. McNulty, Chairman, Committee for Natural Sciences, Utah Heritage Foundation, 102 Greenhouse, University of Utah, Salt Lake City, Utah 84112

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8. Dr. Thadis W. Box, Dean, College of Natural Resources, Utah State University, Logan, Utah 84321

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* 2. Mr. Bob Woody, c/o SALT LAKE TRIBUNE, 143 South Main Street, Salt Lake City, Utah 84111

* 3. Mr. Alex Bene, Editor, THE SUN ADVOCATE, Price, Utah 84501

* 4. Mr. Sam Taylor, Publisher, TIMES INDEPENDENT, Moab, Utah 84532

* 5. Mr. Douglas Wright, Publisher, PROGRESS-LEADER, Castle Dale, Utah 84513

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* With press release to each

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7. Dr. Charles S. Peterson, Director, Division of State History, 603 East South Temple, Salt Lake City, Utah 84102

8. Dr. LeRoy Kuehl, Wasatch Mountain Club, 1934 Michigan Avenue, Salt Lake City, Utah 84108

9. President, Wasatch Mountain Club, 425 South 8th West, Salt Lake City, Utah 84104

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14. Mr. Thomas E. Cahill, Western States Water Council, 1725 University Club Bldg., Salt Lake City, Utah 84111

15. Mr. Clyde Ritchie, President, Utah Water Users' Association, Heber City, Utah 84032

16. Mr. Mike Frome, Conservation Editor, FIELD AND STREAM Magazine, 9426 Forest Haven Drive, Alexandria, Virginia 22309

17. Mr. Ray Bitters, Intermountain Sportsman's, 590 East 3rd Street, Kaysville, Utah 84037

18. Mr. Dave Wallace, President, Utah Sportsman's Assn., 1073 North 451 West, Sunset, Utah 84015

19. Mr. Frank W. Bohman, Utah Assn. of Soil Conservation, Morgan, Utah 84050

20. Mr. Lloyd Stevens, Supervisor, Southeastern Region Office, Division of Wildlife Resources, 455 West Railroad Avenue, Price, Utah 84501

21. Mr. Gardell Snow, Southeastern Utah Economic Development District, 109 South Carbon Avenue, Price, Utah 84501

22. Mr. Don Hoffman, Grand County Industrial Development Committee, Moab, Utah 84532

23. Mr. Keith Ware, Emery County Industrial Development Committee, Orangeville, Utah 84537

24. Mr. Lenn Jensen, San Pete Industrial Development Committee, Manti, Utah 84642

25. Mr. Bob Folks, Four Corners Regional Commission, Suite 238, Petroleum Plaza Building, 3535 East 30th Street, Farmington, New Mexico 87401

26. Mr. Donald Juneau, Dinebeinna Nahiilna Be Agaditahe, P. O. Box 967, Shiprock, New Mexico 87420

27. Mr. W. A. Williams, Peabody Coal Company, 3800 North Central Avenue, Phoenix, Arizona 85012

28. Museum of Northern Arizona, c/o Dr. Eric G. Walther, Executive Director, Colorado Plateau Environmental Advisory Council, P. O. Box 1389, Flagstaff, Arizona 86001

29. Mr. A. J. Pfister, Salt River Project, P. O. Box 815, Phoenix, Arizona 85001

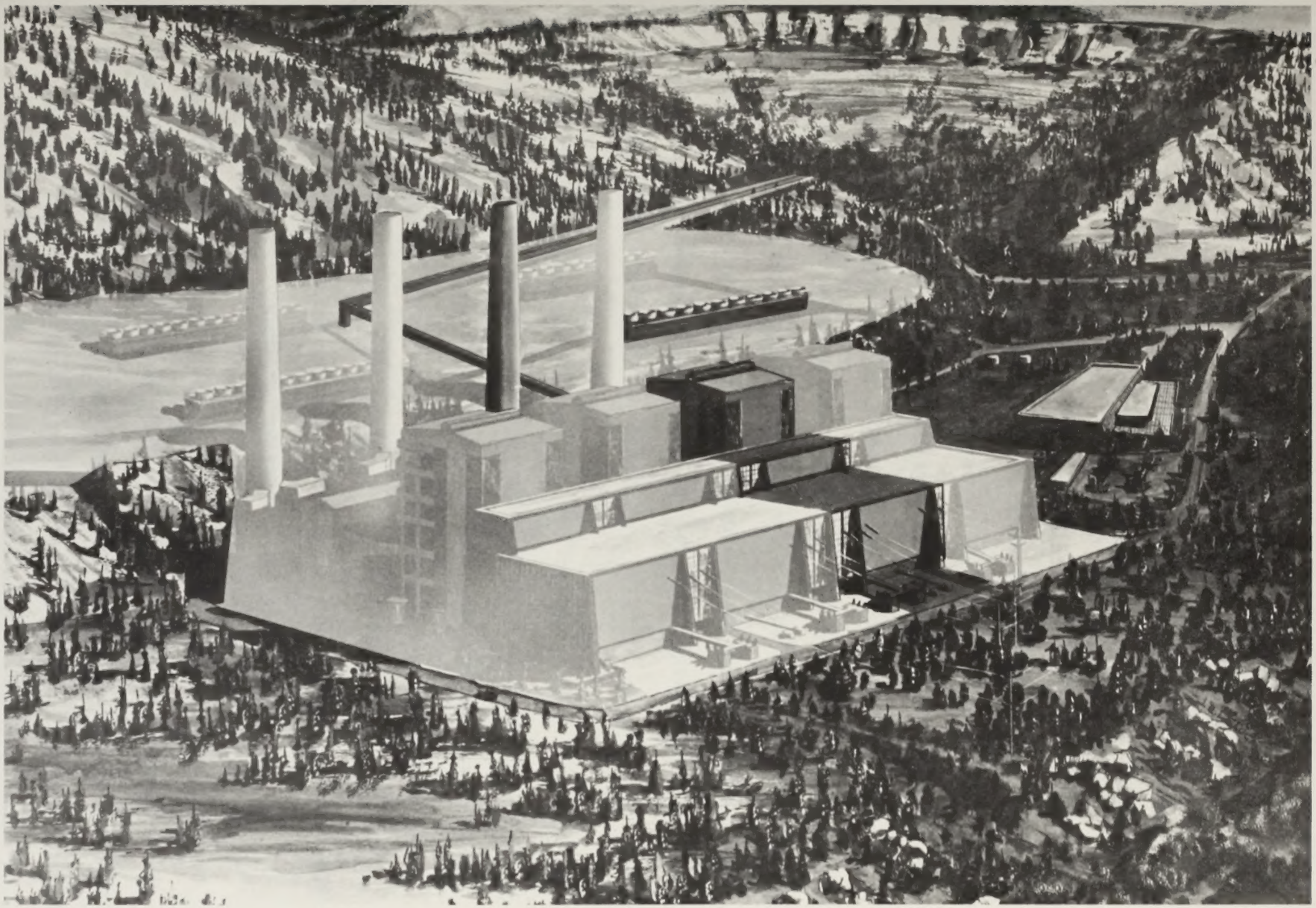
30. Mr. Jim Hunt, SCOPE, Environmental Protection Agency, 760 Market Street, San Francisco, California 94102

31. Mr. Robert Allen, Dames & Moore, 1314 West Peachtree, N.W., Atlanta, Georgia 30309

32. Mr. F. E. Courtney, Jr., Manager, Air Quality Envicon, Inc., P. O. Box 28953, Atlanta, Georgia 30328

## Individuals

1. Mr. Fred L. Montmorency, 3920 Evelyn Road, Ogden, Utah 84403
2. Mr. John Herbert, 1323-31st Street, Ogden, Utah 84403
3. Mr. Virlish Fischer, 1612 Houssels Avenue, Las Vegas, Nevada 89104
4. Miss Jean Torosian, 3675 South 2210 East, Salt Lake City, Utah 84109



Artist's Conception of Huntington Canyon Generating Station

# I. INTRODUCTION

Utah Power & Light Company, Salt Lake City, Utah, is constructing an electric generating station in Huntington Canyon, Utah, approximately 29 miles by road southwest of Price, Utah. The generating station will utilize coal from an underground mine about 2½ miles from the station to be operated by Peabody Coal Company. The first 430 mw unit is planned to be on line in 1974, and present load-growth projections indicate a second unit will be needed by 1978. The generating station may ultimately have a 2,000 mw capacity. While some data in this Statement pertain to the ultimate capacity of 2,000 mw, such data are preliminary, and cannot fully take into account the effects of future technological improvements on control equipment. The Statement deals primarily with the impact of the first 430 mw unit.

Energy from the first generating unit will be transmitted from the generating station principally over a 345 kv line northwest to Camp Williams near Salt Lake City, Utah, and southeast to the Four Corners Area, where it will interconnect with the Arizona Public Service Company system. This line was completed in June 1971 as a part of the Company's interconnected system. Additional transmission capacity will be required as more generating units are installed.

It is planned that cooling water for the station will be diverted from Huntington Creek. The United States, acting through the Department of the Interior, Bureau of Reclamation, is considering a contract with the Company and Emery Water Conservancy District for sale of water to provide

a portion of the required supply. The proposed contract will require the Company to comply with all applicable Federal, State, and local laws, orders, and regulations relating to air and water quality control, as well as requiring control of other environmental aspects.

The construction, operation and maintenance of a dam to provide water storage in Huntington Canyon, the necessary relocation of Forest Highway Route 7 (State Route 31), coal mining, and coal conveyance system, as well as the construction and operation and maintenance of the generating station and transmission line, will affect lands, resources, and interests that are the responsibility of the Department of Agriculture, Forest Service; Department of Transportation, Federal Highway Administration; Department of the Interior, Bureau of Land Management and Bureau of Sport Fisheries and Wildlife, in addition to the Bureau of Reclamation, as mentioned above.

This Environmental Statement has been prepared by the foregoing Federal agencies in compliance with Section 102(2)(C) of the National Environmental Policy Act (P. L. 91-190). Expansion of the Huntington Canyon Generating Station beyond the initial 430 mw unit will involve environmental impact effects not considered in this draft Statement.

Individual Impact Statements will be submitted for approval on each subsequent unit--such Statements covering the pollution control equipment to be installed, the transmission requirements, and all other details required to fully describe the addition and its impact in accordance with the National Environmental Policy Act and the guidelines of the Council on Environmental Quality.

Section 11 of the Guidelines for Federal Agencies of the Environmental Policy Act provides the following: "Application of Section 102(2)(C) procedure to existing projects and programs. To the maximum extent practicable, the Section 102(2)(C) procedure should be applied to further major Federal actions having a significant effect on the environment even though they arise from projects or programs initiated prior to enactment of the Act on January 1, 1970. Where it is not practicable to reassess the basic course of action, it is still important that further incremental major actions be shaped so as to minimize adverse environmental consequences. It is also important in further action that account be taken of environmental consequences not fully evaluated at the outset of the project or program."

As of January 1, 1970, years of investigation had been completed and actions taken so that the Company does not consider it practical to reassess the basic course of action relative to the first unit of the Huntington Canyon Generating Station. Both the Company and Government agencies, however, have taken all appropriate action in compliance with Section 11 of the Guidelines. Following is a general review of those actions they had taken in connection with the construction of the Huntington Canyon Generating Station and Transmission Lines prior to and shortly after enactment of the National Environmental Policy Act to illustrate the impracticability of reassessing the basic course of action to proceed with construction.

A study of possible sites had been started as early as 1967, but was placed on an urgent basis early in 1968 as it became apparent that

additional energy would be required for the Company's interconnected system by 1974. The availability of coal and water was first investigated in 1967, and this investigation continued through the remainder of 1968. A letter of intent covering coal purchases was executed in September 1969. With the assurance that coal and water were available in sufficient quantities in Huntington Canyon, efforts were pressed for the preparation of plans for the generating station, for the reservoir, and for the transmission line.

Discussions with water users leading to the purchase of water stock were initiated in March of 1968 and continued throughout the years 1968-69, and consummated in the execution of contracts with the Huntington-Cleveland Irrigation Company and the Cottonwood Creek Consolidated Irrigation Company in December 1969. Arrangements were made at the same time to secure options from the individual stockholders. The option forms were prepared, and the options were secured during the period between December 1969 and March 1970, and were exercised in December of 1970.

After the options had been secured and the amount of water obtainable had been more or less accurately determined, final plans could then be made for the reservoir, to be known as Electric Lake. The necessary applications for the reservoir had been filed in December 1968 with the Utah State Engineer. The reservoir site investigation and preliminary engineering were commenced in the fall of 1969. In the meantime, and commencing late in 1969, negotiations were commenced with the Utah State Road Commission, the U. S. Forest Service, and the U. S. Bureau of Public Roads with regard

to the relocation of the Huntington Canyon Highway. The contract was executed on November 10, 1970, under which the Company agreed to pay and has paid the engineering cost involved in this road relocation.

Commencing early in 1969 and continuing throughout the year, a series of meetings were held with representatives of the U. S. Forest Service and the U. S. Bureau of Land Management with respect to the location of the Camp Williams-Four Corners 345 kv Transmission Line. Right-of-way applications were filed with these agencies late in 1969 and early in 1970, and purchase of private right-of-way commenced in February 1970. Most of the material, including poles, insulators, conductors and cross-arms, was purchased in November and December 1969. The construction contracts were awarded in January 1970, and the construction actually commenced in March and April of that year.

In connection with the generating station itself, it can be noted that bids were invited for the turbo-generator in June 1969, and a letter of intent for its purchase was issued in August 1969. Bids for the steam generator were invited in November 1969, and a letter of intent for this item issued in June 1970. The engineering contract with Stearns-Roger was approved in March 1970 after having been in the negotiating stage for a number of months. It must be kept in mind with respect to all of the dates set forth above, upon which final action was taken, that they represent many months of preparation and negotiation.

The Company concludes that it would have been both impracticable and

impossible to have attempted on January 1, 1970, to have changed the basic course of action with respect to the Huntington Canyon Generating Station and Transmission Lines and still have been able to have the needed energy available by 1974.

## II. NEED FOR ADDITIONAL GENERATING STATION CAPACITY AND SELECTION OF SITE

### A. Need

The Western Systems Coordinating Council estimates the Company's system load at 1,400 mw in 1974, as compared with 1,100 mw in the summer of 1971.

The Company forecasts show a summer peak load requirement in 1974 of about 200 mw above what its existing resources at that time will provide. Additional capacity is essential to meet the growing demand for electrical energy on the Company's system. The Company's peak load and peaking capability are shown on a chart in the Appendix.

### B. Studies and Factors Considered in Selection of Site

The Company studied about 17 possible sites, beginning in 1967, before a decision was made in favor of the Huntington Canyon site.

The factors considered in the evaluation of the various sites included:

1. Availability and cost of fuel and water.

2. Transmission line locations and cost and their environmental impact.

3. The prospective location with respect to overall system reliability and efficiency.

4. Environmental considerations of the generating station, such as:

    a. Stack gas dispersion
    b. Fumigation and inversion conditions

c. Aesthetic factors
d. Water quality effects
e. Impact on fish and wildlife
f. Noise impact
g. Effect of coal-mining operation
h. Effect of necessary road relocations

5. Topography

C. Advantages of Huntington Canyon Site

Based on the foregoing factors, the Company decided that Huntington Canyon site offered the following advantages over alternative sites:

1. The location of the generating station near the mouth of a canyon was believed to offer some advantages in maintaining air quality because of the natural air movement--a condition which the Company had observed in other of its generating station locations.

2. The coal conveyance system, reserve coal pile, and ash disposal area do not intrude excessively on the environment. These features are not visible from the present roads or the generating station site.

3. The route of the transmission line could be located to comply with environmental standards of agencies administering the land on which the transmission line was to be constructed.

4. The water supply facilities could be constructed and operated to minimize adverse effects and, in some respects, to enhance fishing and recreational values.

5. The generating station would be a boost to the economy of a sparsely settled county with a small tax base.

6. The economics of the Huntington Canyon site were favorable, and the generating station would fit well into the Company's overall system.

7. The necessary road relocation could be accomplished without serious environmental degradation and, in fact, would have a beneficial impact.

8. The location of the coal supply near to the site minimizes the environmental impact caused by transporting coal.

## III. GENERAL DESCRIPTION OF THE HUNTINGTON CANYON GENERATING STATION, APPURTENANT FACILITIES, AND PROJECT AREA

### A. Generating Station and Appurtenant Facilities

The Company has furnished the following data describing this generating station and transmission facilities:

The generating station will be located in Emery County, Utah, approximately 29 miles by road southwest of Price, Utah, as shown on the location map in the Appendix. The majority of the land on which the generating station is being constructed was owned by the Utah State Division of Wildlife Resources. A 36-acre tract is under the jurisdiction of the Bureau of Land Management. A small part is privately owned. The Company has a contract with the Utah State Division of Wildlife Resources to exchange the generating station site land for other lands, and the land has been deeded to the Company. BLM has issued a permit for use of the tract under its jurisdiction. Arrangements are underway to transfer this tract to the State of Utah as lieu land, and the Company would then purchase it from the State.

Fuel for the generating station will be coal from an underground mine, about 2½ miles from the generating station, to be operated by the Peabody Coal Company. The mine is located on coal-fee lands within the boundaries of the Manti-La Sal National Forest. Peabody has additional Federal coal leases on the adjoining National Forest system lands. Coal will be mined by underground methods from two major seams. The thickness of the coal seam in the Blind Canyon seam is about 13 feet. The thickness of the

Hiawatha seam explored is about 10-13 feet. The underground mine will employ bolted-roof protection with sidewall cribbing where necessary. The Company anticipates that there will be no excess water during the mining operation; but if excess water is encountered, it will be directed to settling ponds for station use, or to evaporation ponds. The coal will be conveyed to the generating station as mine run. No washing will take place at the mine. Coal will be transported to the generating station by covered conveyor. Average coal consumption is estimated at 1 million tons per year for a 430 mw unit. Coal reserves are estimated to be sufficient for a 2000 mw generating station for its projected 35-year life.

Cooling water will be taken from Huntington Creek to a settling basin before being used as makeup in the cooling system. An upstream reservoir of about 30,000 acre-foot capacity (named Electric Lake) will provide a supplemental water supply. The upper part of the reservoir area (Electric Lake), about 40 acres, is National Forest land, and an application for use of this land is pending. The lower reservoir area is owned by the Company. This reservoir will be about 4½ miles long and 215' deep at the dam. Discussions are continuing among the Company, Utah State Department of Natural Resources, and Forest Service to plan the most beneficial development and use of the reservoir area for recreation.

Energy from the initial unit will be transmitted principally over a 345 kv line to Camp Williams, near Salt Lake City, Utah, and to the Four Corners Area, where it interconnects with the Arizona Public

Service Company system. The line was completed as a part of the Company's system in June 1971. A map showing the route of the line is included in the Appendix. Additional transmission capacity will be required as generating units (after the first 430 mw unit) are brought on line.

It is planned that the first 430 mw unit will be on line in 1974 and present load projections indicate a second unit will be needed by 1978. Scheduled dates for other units have not been established. A progress report summary on the construction of the generating station as of July 1, 1971, is included in the Appendix.

B. Project Area

1. Geology and Landforms - Huntington Creek

Approximately 3,500 feet of sedimentary rocks, ranging in age from Upper Cretaceous to Tertiary, are exposed in the drainages of Huntington Creek and the Left Fork of Huntington Creek.

The rock strata are essentially flat lying, but with a slight regional dip westward, ranging from southwest to northwest. Dips in almost all directions, from localized folding, have been noted in the area of the proposed road relocation and the reservoir. The relationship between the dip of the beds and the interfaces between more permeable and less permeable rock may be critical to slope stability under conditions of surface disturbance and water-level fluctuation.

The rock strata are broken by groups of normal, high-angle faults. One group, trending approximately north-south, extends from the Scofield Reservoir area to the emergence of lower Huntington Creek at the Forest Boundary. Another, also trending approximately north-south, extends from south of Joes Valley to the upper Huntington Creek-Gooseberry divide. Another, trending northeast-southwest, crosses the upper Huntington Creek area in the general vicinity of the proposed reservoir and road relocation, from the head of the gorge of the Left Fork of Huntington Creek. Gross landforms derived are: Graben Valley crossed by tributaries of the Left Fork (structurally adjusted stream courses) faultline scarp ridges. Faults indicate the area has been seismically active.

Glacially-formed topographic features are characteristic of the tributary areas of the western drainages of Huntington Creek and Left Fork of Huntington Creek - cirques, moraines, widened valleys, and outwash deposits.

The drainage ranges in elevation from about 6,500 feet at the lower Forest Boundary to over 11,000 feet at the highest divide.

2. Climate

The climate within the proposed project area is varied. Lower Huntington Canyon is a semi-arid environment (12 inches precipitation annually). Primarily, the precipitation received is from summer storm activity. These are usually high-intensity thunderstorms. Winter snows on the area are generally not excessive. The

nights are cool to warm with hot daytime temperature in the summer. The prevailing winds are generally from the southwest with the normal up and down-canyon variations. Upper Huntington Canyon has a semi-humid montane environment (30-40 inches precipitation). Precipitation on this area is primarily from winter snow. The winter snowpack is substantial. Summer storms are quite prevalent. The nights are cool and the days warm throughout the summer months. The prevailing winds are generally from the southwest and west on the area.

3. Soils

In upper Huntington Canyon, the top soils within the proposed project area vary from a silt loam to silty sand. The gradient and stability likewise vary throughout the project--from very steep side slopes with stability problems in the proposed dam and road takeoff area to more moderate, rolling type topography with fairly stable characteristics along the upper portions of the project.

In the lower reaches of Huntington Canyon, soils in the project area are principally stony sandy loam from alluvial deposits and outwash from the slopes. Large rocks and boulders are abundant--both on top and beneath the surface. Numerous rock-ledge outcrops are on the area. In general, the area is eroded with moderate to large gullies in the canyon bottoms.

4. Water

Huntington Canyon comprises the watershed that supplies both culinary and irrigation water for North Emery County. Water is stored

in reservoirs during periods of high flow for release throughout the water-short summer months. In years past, portions of the watershed have been abused which caused local flooding and a degradation of water quality. More recently, the watershed has become more stabilized which has improved both the quantity and quality of the water. Agriculture has been a considerable share of the economy in northern Emery County; hence the water is very important.

5. Air

Air quality has not been a problem in this general area. There has been plenty of good, clean air available with the exception of some small isolated cases of inversions.

6. Vegetation

The vegetation in lower Huntington Canyon, including the generating station site, is pinon-juniper and associated browse and sage types. It is generally sparse. The upper reaches of Huntington Canyon are more open country with sagebrush-grass vegetation on moderate steep side slopes and generally open-canyon bottom.

In the vicinity of the proposed dam and reservoir, the vegetative type is generally sagebrush-grass on the side hills and wet meadow type along the creek bottoms. The timber type is scattered aspen with Douglas fir and spruce pockets on the north sloping ridges. Generally, the timber type is above the high waterline. The timber is more important aesthetically than commercially.

Along the proposed road relocation area, the vegetation varies from heavy spruce and sagebrush-grass-forb types to scattered aspen and subalpine type along the Skyline Drive. Present vegetative cover provides moderate protection to soils along the route. Within the proposed relocation area, there are several wet meadow types.

7. Animals

a. Wildlife

The proposed project area is used by big-game animals. Deer, elk, small mammals, nongame birds, and small game are found on the area. Big-game hunters use the area quite extensively during the fall hunting seasons. In the winter, animals move from higher country to the lower portions of Huntington Canyon. A list of mammals occurring in the Huntington Canyon headwaters is contained in the Appendix. Birdlife is an attractive and significant element of the environment.

b. Domestic Animals

The proposed project area is used by several bands of sheep and some cattle for summer grazing.

8. Fisheries

Huntington Creek provides some of the best stream fishing in eastern Utah. The stream area that will be inundated by the proposed reservoir is some of the best habitat for fish reproduction that is found along the entire stream length. The gradient is not excessive, and

there is abundant riparian vegetation along the stream banks. There is a list of fishes of the headwaters of Huntington Creek in the Appendix.

9. Minerals

Throughout the immediate area, coal is the most prevalent and most sought after mineral. There are two main coal seams that are mined: The Blind Canyon seam which is about 13 feet thick, and the Hiawatha seam which varies in thickness from 10-13 feet. All of the mines in this area are mined by underground methods. Usually, these two coal seams come to the surface along the steep escarpment rising out of the valley. Mine portals are constructed along this face. Coal mining is an important component of the economic makeup for the entire area of Carbon and Emery Counties.

Recent developments in the coal-mining industry have introduced new methods and machinery. Fewer people can now mine more coal than the previous larger work force.

The importance of coal to this area has been magnified by the marketing and shipment of coal to the midwest and even to Japan. Large contracts have been entered into by local mines to supply several large industries.

With development of the project, the mines will benefit considerably from the increased technology that will be brought into the area.

10. Archaeology and Historical Values

The immediate area is not rich in archaeological history. The artifacts that are found indicate the area was used primarily as a hunting and traveling corridor. Brigham Young University was commissioned to conduct an in-depth review and survey of the area. No artifacts were found in this review.

Connelsville is the only known historical site in the area. This site will be inundated by Electric Lake.

11. Natural Beauty

The landscape in lower Huntington Canyon is characterized generally by a pinon-juniper type vegetation community. The terrain rises steeply from the semidesert valley floor to high-mountain plateaus. There is a prominent escarpment of several hundred feet that rises spectacularly from the valley of Deer Creek Canyon. Large rock and talus slopes have tumbled down to form interesting scenic variations. The area abounds with deer in the winter and spring, and many people visit the area to witness their presence.

The area along the route of the Huntington-Fairview Forest Highway is comprised of a variety of vegetative types. The heavy spruce timber on the north slopes, where the road leaves Huntington Creek, gives way to sagegrass types. Farther along the route, there is aspen and a subalpine type along the Skyline Drive. Wildlife and domestic animals utilize the area for summer grazing. They are visible from the travel routes. Many people enjoy the serenity that is found in

viewing the natural beauty along the route.

12. Range

The area of the dam and reservoir is within five Forest Service grazing allotments. They are as follows:

| | |
|---|---|
| Burnout | Cox Canyon |
| Coal Ridge | Kemmerer Coal |
| Sand Dugway | |

There is a large block of private land owned by various people. Generally, these same people are permittees on adjoining Federal range. They manage the herds by waiving their private land and running one herd on both lands. This facilitates management.

The Range Environmental Analysis has been completed by the Forest Service on most of these allotments. Stocking will be adjusted to the indicated carrying capacity within the next few years. The livestock that are permitted on these and adjoining allotments are generally from Sanpete County. Sheep trailing routes either follow or cross Huntington Creek to get to the allotments on the east side of Huntington Canyon.

Private lands and public domain in the vicinity of the generating station site receive moderate livestock grazing use. The area is also important for providing deer winter range.

13. Recreation

This general area is within one of the most heavily used recreation areas of the Manti Division of the National Forest. Flat Canyon

Campground at the north and Old Folks Flat Campground on the south are the only developed campgrounds in the vicinity of the proposed Electric Lake. People are using these areas in increasing numbers each year. The main recreation activities engaged in by the visitors to the area are stream fishing, camping, picnicking, and the pleasure of aesthetic viewing. Big-game hunters make heavy use of the area during hunting seasons. It has been found at Joes Valley and Huntington North Reservoirs that people are enthusiastic about water-oriented sports where the opportunity exists.

C. Transmission Line

The transmission line passes through a great variety of land forms and vegetative types, as well as through some high density populated areas. The map in the Appendix shows the route of the line. See the "Transmission Line" section under "Environmental Impact" of this Statement for additional information.

D. Forest Highway

Relocation of Forest Highway Route 7 (State Route 31) around the proposed dam and reservoir (Electric Lake) will be required. The relocation begins at Station 1325+00, approximately 27 miles west of Utah State Route 10 through Huntington, Utah. From the beginning, the road stays on the north side of Huntington Creek in the bottom of the canyon to about Station 1330, where it crosses the creek and starts to climb up the south side of the canyon to clear the Electric Lake Dam and Reservoir. After climbing out of the canyon to clear the dam, the

route proceeds west to about Station 1380, where it turns south up a large draw toward Cleveland Reservoir. It passes north of Cleveland Reservoir staying high enough to clear any possible future high-water level. Continuing northwesterly, the proposed route passes northeast of Huntington Reservoir; thence north and west crossing the Skyline Drive at about Station 1790; thence westerly and northerly about 1 mile west of Fairview Lakes, and continuing northerly to connect with the present road from Fairview at about Station 2080, approximately 2 miles directly north of Fairview Lakes. Prior to the decision to develop the generating facilities, the Federal Highway Administration had surveyed the Forest Highway route up the bottom of the canyon essentially on the present road. The proposed road design provides for minimum roadway width in accordance with American Association of State Highway Officials design criteria. The proposed typical section provides two 11-foot traffic lanes, 4-foot and 6-foot shoulders, and 8 to 1 pavement slopes. Design speed is 30 mph climbing out of the canyon, and 40 mph after the proposed highway comes out on top in easier terrain. These criteria are considered adequate by Federal Highway Administration since the prime use of this road will be recreational. The relocation will be about 15 miles in length. (A sketch of the general route is included in the Appendix.)

Several alternate locations have been studied but have been rejected due to soil conditions, construction difficulty, or adverse economics.

Full bench section on the canyon walls will eliminate sliver fills. Adjustment of the profile grade to better fit the terrain, topsoiling, seeding, and landscaping will be performed.

## IV. SOURCES OF ENVIRONMENTAL IMPACT

Impacts on the environment may arise from:

1. Construction of the generating station, transmission facilities, water storage reservoir, and road relocation.

2. Flue gas emissions from burning 800,000 to 1,200,000 tons of coal per year for a 430 mw unit.

3. Disposal of an estimated 80,000 tons of ash produced annually for a 430 mw unit, including possible leaching action.

4. Noise from generating station operation.

5. Intrusion of generating station structure on natural environment (aesthetic impact).

6. Coal-mining operation and coal conveyance, including possibility of water pollution from mine drainage water if water is encountered.

7. Use of approximately 7,000 acre-feet of water annually for a 430 mw unit.

8. Generating station wastes, such as sanitary, oil, chemical discharges, or the wastes from water treatment.

## V. POWER COMPANY ENVIRONMENTAL PROTECTION POLICY

The Company statement on protection of environment (1-14-71) is included in the Appendix.

## VI. AGENCIES AND ORGANIZATIONS WITH ENVIRONMENTAL RESPONSIBILITIES AND INTERESTS

The agencies and organizations directly involved, or with major interests and responsibilities in the environmental impact of the Huntington Canyon generating station and transmission line, in addition to the general public, include:

1. Utah State Department of Natural Resources, Division of Parks and Recreation, and Bureau of Environmental Quality, Utah State Division of Health, in the discharge of their responsibilities for natural resources, recreation, and environmental quality control in the State of Utah.

2. The Air Pollution Control Office and the Water Quality Office of the Environmental Protection Agency, as a part of their overall responsibility for control and abatement of air and water pollution.

3. The United States Department of the Interior, Bureau of Reclamation, in its responsibility for environmental protection under the proposed water service contract, and in its role as a Federal Government agency under the provisions of P. L. 91-190 and Executive Order 11514.

4. The Department of Agriculture, Forest Service, in discharging its responsibilities with respect to National Forest lands, and particularly to the Manti-La Sal Forest.

5. Department of the Interior, Bureau of Land Management, with public land management responsibilities of natural resources and public domain in the vicinity of the generating station, coal mine, and transmission line.

6. The Four Corners Regional Commission, because of its interest in the economic impact of the generating station on Emery County communities, where the economy needs stimulation.

7. Department of the Interior, Bureau of Sport Fisheries and Wildlife, and Utah State Division of Wildlife Resources, in connection with their responsibilities for protection and enhancement of fish and wildlife resources.

8. The Colorado Plateau Environmental Advisory Council, whose objectives and functions are explained under the "Environmental Studies" section of this Statement.

9. Department of Transportation, Federal Highway Administration, in its responsibility for highway construction and relocation.

10. Conservation groups interested in enhancing and preserving environmental values.

11. Universities, particularly those mentioned in this Statement, that are performing specific research and study.

12. Indian Tribes involved in granting right-of-way for the transmission line.

## VII. ENVIRONMENTAL STUDIES

Environmental studies already completed have been used to assess the probable impact of the generating station on the environment and to determine the necessary environmental protection and control. Additional pre- and post-operational environmental measurements will be used to confirm or to establish the actual impacts and to provide information necessary for specifying environmental protection for additional units.

1. North American Weather Consultants' summary of results of meteorological survey of Huntington Canyon plantsite is included in the Appendix.

2. Statements by the University of Utah and Brigham Young University on the environmental studies being conducted by these institutions on the Huntington Canyon generating station are included in the Appendix. Also included in the Appendix is an excerpt from the University of Utah first quarterly progress report for the period July through September 1970, which shows the general nature of the research being undertaken, and an excerpt from its February 1971 progress report giving results of studies to that date. North American Weather Consultants have investigated meteorology and dispersion of stack effluent in the area that might be influenced by the Station. Stearns-Roger Corporation, Denver, Colorado, is incorporating the data from these studies in its generating station design and in specifications for air quality control equipment.

3. The Forest Service has made an environmental analysis of the Huntington Canyon generating station, transmission line, Forest Highway Relocation, Electric Dam and Reservoir, and Deer Creek coal mine and coal conveyance system on the Manti-La Sal National Forest.[7]

4. A cooperative study involving Bureau of Sport Fisheries and Wildlife, Utah State Division of Wildlife Resources, Forest Service, and Utah Power & Light Company is underway to arrive at the best plan for protection and enhancement of fish and wildlife resources consistent with generating station operations and maintenance requirements.

5. Brigham Young University conducted an archaeological survey of the generating station site. Forest Service has completed an archaeological survey of the Forest Highway relocation. No significant archaeological evidence was found. BLM conducted archaeological surveys in connection with location of the transmission line in significant archaeological areas of southeast Utah.

6. BLM is involved in continuing vegetative trend studies on public land in the vicinity of the generating station site. The program will be expanded to other plant species, including deciduous trees, conifers, additional browse, and grass species. Study plots will be established at various elevations south and east of the generating station site.

7. A physiological study of deer and small mammals in the Huntington Canyon area will be carried out by the Utah Division of Wildlife Resources with funds provided by the Company.

8. An organization known as the Colorado Plateau Environmental Advisory Council was formed in September 1970 for the purpose of collecting and maintaining data concerning all environmental features of the Colorado Plateau, and to encourage and coordinate research efforts which should lead to an exhaustive understanding of the past, present, and future environment of the Plateau area. The Colorado Plateau is defined as the drainage area of the Colorado River upstream of the Mogollan Rim.

## VIII. METEOROLOGICAL STUDIES

The Huntington Canyon Generating Station site is far removed from the places in Utah and Colorado, where observations of upper air winds and temperatures are regularly made by the National Weather Service. Intervening high-mountain ranges and local canyon topography combine with distance to prevent reliable extrapolation from available, long-term upper air records in inferring the diffusional behavior of the atmosphere in the vicinity of the site. Local observations, in combination with general knowledge of the effects of canyon topography on atmospheric circulation, offer the best available basis for prediction of plume dispersion from the Huntington Canyon site.

In recognition of this, Utah Power & Light Company contracted with North American Weather Consultants (NAWC) in 1969 to carry out a meteorological study of the proposed generating station site.

### A. Onsite Meteorological Program

In mid-December 1969, NAWC installed a meteorological station at the proposed generating station site. This meteorological station consists of an anemometer mounted on an 18-foot pole with a standard instrument shelter 6 feet above the ground, housing the wind recorder, a hydrothermograph, and a maximum-minimum thermometer. Continuous recordings of surface temperature and humidity and winds at the 20-foot level are made. In March 1970, the meteorological program was expanded to include twice weekly soundings of the vertical structure of temperature and humidity. These are made

by flying an instrumented aircraft between elevations of about 6,500 feet and 11,000 feet in Huntington Canyon. For flight safety reasons, the focal point of the sounding flights is approximately 3 miles southeast of the generating station site.

Beginning in August 1970, the onsite meteorological program has been further augmented by four data-collection expeditions held August 2-8, 1970; September 23-28, 1970; December 3-8, 1970; and January 27-February 1, 1971. These field expeditions collected upper air information using rawinsondes (radio wind sounding equipment), rapidly rising pilot ballons, and low-lift constant volume balloons which tend to follow streamlines in moving air. In addition to the generating station site data, observations were taken in the town of Huntington during each of the latter three field expeditions. These included surface winds, surface temperatures, and winds aloft determined by theodolite tracking of pilot baloons.

To February 1, 1971, 122 aircraft soundings, 42 rawindsonde observations, 224 pilot balloon observations, and 70 airmass trajectory observations made with low-lift constant volume balloons have been taken in addition to the surface records previously described. The data-collection program by NAWC was summarized in its report of April 1971,[8] and onsite measurements are continuing.

B. Results

The winds in Huntington Canyon are observed to be a vigorous mountain-valley system with classic up-canyon flow during daytime hours and down-canyon flow during night and morning hours. The morning transition

occurs around 9 to 10 a.m. and the evening one between 4 and 7 p.m. Seasonal variations have been observed with considerably stronger winds and long duration up-canyon flows in summer than in winter. The circumstances most adverse for plume dispersion should occur in winter, when the highest potential for stagnation should exist.

Observations taken during dominance of high barometric pressures indicate that the subsidence inversion and the ground-level inversion produced by nocturnal radiation are clearly separate. Bases of the subsidence inversion are around 2,000 feet above the surface while the ground inversion extends from the surface to about 400 feet. On stagnant winter days, insolation can generally, but not always, be expected to eliminate the ground-level inversions during the morning hours, but the heating is generally insufficient to remove the upper inversions formed between 2,000 and 3,000 feet by the subsiding high-pressure airmasses. Such days are characterized by weak up-canyon flow during the midday period with the vertical mixing depth restricted to about 2,000 feet. Night and morning flows during such cases of limited mixing provide persistent horizontal ventilation with a pronounced low-level jet at about 300 to 400 feet above the surface.

The constant volume balloon observations taken on up-canyon flow indicated chimney effects in the narrow upper part of Huntington Canyon. The balloons were either lifted over the ridge northwest of the generating station site or continued up Huntington Canyon.

In winter cases of down-canyon flow, the trajectories of constant volume balloons tended to turn from southeasterly headings to the south on nearing the canyon mouth. This suggests that the centerline of the diffusing plume from the generating station could pass south of the town of Huntington during stable winter episodes. How reliably this would happen could only be answered by extensive further observations.

Equations available for modeling the diffusion of a plume released from an elevated smokestack assume that the terrain downwind from the stack is level. When the downwind terrain is not level, as in the Huntington Canyon site situation, interpretation of the results of modeling computations becomes complex. A conservative assumption is that elevated terrain receives a concentration on its surface equal to that which would exist at the same coordinates within a diffusing plume were it flowing over level terrain. Use of this assumption might result in computed concentrations which exceed what would be actually observed over the elevated terrain. Observations of flow-over models of mountain terrain in low-speed wind tunnels suggest that streamlines can be deformed upward by elevated terrain and do not always impact the terrain at free air elevation. There have been observations of plume impaction in the real atmosphere which justify making the more conservative assumption.

In addition to the complications introduced by irregular terrain, modeling results include other uncertainties. The final results are subject to wide-ranging variation, depending on what plume rise equation is used, and what assumptions are made concerning the stability of the atmosphere.

At the request of the Bureau of Reclamation, air quality experts of the Tennessee Valley Authority made independent modeling studies of diffusion to be expected southeast of the Huntington Canyon site on the premise that the generating station would be the only major source of air pollutants. A copy of the data furnished TVA for these studies is included in the Appendix. TVA estimates are shown in the following tabulation:

TABLE 1

Estimated 1-Hour Average Maximum Concentrations of $SO_2$

| Stack Height (feet) | Coning Model Concentration (p.p.m.) | Coning Model Concentration ($\mu g/m^3$) | Coning Model Distance (mi) | Inversion Breakup Model Concentration (p.p.m.) | Inversion Breakup Model Concentration ($\mu g/m^3$) | Inversion Breakup Model Distance (mi) | Limited Mixing Layer Model Concentration (p.p.m.) | Limited Mixing Layer Model Concentration ($\mu g/m^3$) | Limited Mixing Layer Model Distance (mi) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 430 mw Capacity | | | | | |
| 600 | .010 | 22 | 2.0 | .030 | 67 | 7.0 | .064 | 140 | 2.0 |
| | | | | 2,000 mw Capacity | | | | | |
| 600 | .06 | 130 | 2.0 | .10 | 220 | 7.0 | .33 | 740 | 2.0 |

Note: The mean daily concentration will not exceed 25% of the above values 95% of the time.

As a direct comparison with State and Federal standards, the State standard permits an ambient $SO_2$ concentration of 0.1 p.p.m. as a 24-hour average. The Federal standard permits an ambient concentration of 0.14 p.p.m. as a primary standard and 0.1 as a secondary standard.

A report prepared by North American Weather Consultants on a meteorological evaluation of dispersion of stack effluent[8] gives additional information on this subject.

Also included in the Appendix is an excerpt from the latest report (February 1971) of the Utah Engineering Experimental Station Center for Environmental Studies, University of Utah, covering its monitoring and testing program and its results to March 1, 1971. The objective of the study is to establish the influence of the Huntington Canyon Generating Station on ambient air quality.[9]

## IX. IMPACT ON THE ENVIRONMENT

### A. Generating Station

This section summarizes the research and planning that have been accomplished by the Company, Stearns-Roger, North American Weather Consultants, Brigham Young University, and University of Utah to determine the impact on the environment of the generating station and its operation, control measures that are planned, and related information with respect to:

| | |
|---|---|
| Air Quality | Aesthetics |
| Water Quality | Archaeology |
| Ash Disposal | Radiation |
| Noise Levels | Fish and Wildlife |

#### 1. Air Quality

##### a. Stack Emissions

Estimated stack emissions of a 430 mw unit of the generating station at full load are as follows:

TABLE 2

Huntington Canyon Generating Station
Estimated Stack Emissions at 430 mw

| | Coal from Hiawatha Seam | | Coal from Blind Canyon Seam | |
|---|---|---|---|---|
| | p.p.m. | Tons/day | p.p.m. | Tons/day |
| $CO_2$ | 136,101 | 10,187 | 134,062 | 9,948 |
| $H_2O$ | 67,250 | 2,060 | 69,154 | 2,085 |
| $N_2$ | 754,636 | 35,944 | 754,953 | 36,107 |
| $O_2$ | 41,146 | 2,239 | 41,073 | 2,209 |
| *$SO_x$ | 417 | 44.8 | 308 | 32.9 |
| *$NO_x$ as $NO_2$ | 450 | 36.0 | 450 | 35.3 |
| Ash (with 99.5% efficient electrostatic precipitator) | | 1.4 | | .9 |

* Note: Without controls, except such control of $NO_x$ as can be effected in the furnace.

b. Plans to Maintain Air Quality

The current plans of the Company to maintain air quality in the area subject to the emissions from the Huntington Canyon Generating Station are:

(1) To install a 600-foot stack which the Company's consultants have recommended to provide the most efficient dispersion of flue gases.

(2) To install a cold-end electrostatic precipitator having a design efficiency of 99.5 per cent guaranteed by the manufacturer based on the sulfur and other conditions applicable.

(3) To utilize a low-sulfur coal (average 0.50 per cent sulfur). The average fuel characteristics are shown in the table in the Appendix.

(4) To review the available processes for $SO_2$ removal, to perform a research and development program to speed up the availability of a feasible process, and to provide space for later addition of an effective process.

(5) To install a boiler which utilizes a tangential firing pattern, and to provide other features which may reduce $NO_x$, such as alternate furnace air inlet locations and overfire airports to reduce flame temperature.

(6) To locate the generating station to take advantage of favorable meteorological conditions.

Table 3 presents the estimate of what the ambient air quality will be under the "Limited Mixing Layer Model" conditions (1-hour average) when following this plan, considering the Huntington Canyon Generating Station as the only major source of pollution being added in the area.

TABLE 3

Estimated Relative Air Quality
Huntington Canyon Generating Station
(1-Hour Average)

| | (µg/m3) | | p.p.m. (Volume) | |
|---|---|---|---|---|
| Constituent | 2,000 mw | 430 mw | 2,000 mw | 430 mw |
| $SO_2$ | 740 | 140 | 0.33 | .064 |
| $SO_3$ | 10 | 1.9 | .0036 | .00068 |
| $NO_x$ as $NO_2$ | 930 | 180 | .58 | .11 |
| $CO_2$ | 220,000 | 42,000 | 140 | 27 |
| $O_2$ | 48,000 | 9,200 | 43 | 8.2 |
| $N_2$ | 620,000 | 120,000 | 630 | 120 |
| $H_2O$ as vapor | 35,000 | 6,600 | 56 | 10 |
| Fly ash 99.5% removal | 22 | 4.4 | | |

As a comparison with State of Utah and Federal ambient air standards on a 24-hour basis, the mean daily concentrations will not exceed 25% of the above values 95% of the time. On this basis, the estimated relative air quality is well below existing ambient air standards.

c. Particulate Control

Proposals were requested by the Company, and an analysis and appraisal were made by Stearns-Roger on three types of particulate removal equipment:

(1) Electrostatic (hot end)

(2) Electrostatic (cold end)

(3) Scrubbers

The Company has ordered an electrostatic precipitator (cold end). The manufacturer has guaranteed an efficiency of 99.5 per cent particulate removal which the Company expects will meet Federal and State air quality standards.

Existing electrostatic precipitators are performing at efficiencies greater than 99 per cent on low-sulfur coal on a sustained basis in Australia, Europe, and Africa. Model tests include the large-scale tests at the Company's Naughton No. 3 plant which incorporates an electrostatic precipitator of the same manufacturer as Huntington. Such tests will be conducted in the fall of 1971 after the Naughton Unit is placed in service to assure that a correct liberal precipitator design has been planned for Huntington.

With regard to this subject, TVA commented in a letter of May 25, 1971, regarding this generating station:

> TVA still maintains its skepticism about the ability of manufacturers to provide electrostatic precipitators which can consistently remove 99½ per cent of the ash from coals, such as those to be burned at Huntington Canyon. We are aware of Central Electricity Generating Board's reported results of 99½ per cent or better for several of their units; however, coals with higher ash and sulfur content were being burned by CEGB than will be burned at Huntington. Not all of CEGB's precipitators designed for this high efficiency are meeting their design level of performance. Reported results on the hot-side precipitator at the Ravenswood plant of Consolidated

> Edison are quite encouraging. As much as 99.6 per cent of the ash has been removed from a gas flow of 4,300,000 cubic feet per minute. Since the hot-side precipitator is relatively insensitive to the sulfur and ash content of the coal, it may well have significant advantages over the cold-side precipitator for this installation.
>
> Nevertheless, the design of a precipitator is still more of an art than a science and all involved should be prepared to accept the fact that a long sustained effort including modifications may be required before, if ever, 99.5 per cent efficiency is reliably and consistently attained.

On the other hand DHEW, in its publication, "Control Techniques for Particulate Air Pollutants" (Jan. 1969), states in reference to electrostatic precipitators:

> Such devices are capable of collection efficiencies of at least 99.5 per cent, and it is quite possible that even more efficient systems can be provided if necessary.

In any event, the Company is committed to meeting Federal and State standards on particulates.

d. Sulfur Dioxide Removal

$SO_2$ has been recognized as one of the more critical effluents of coal-burning powerplants. Studies are underway by the Company and its consultants to analyze $SO_2$ removal equipment that could be the most feasible for this generating station. The Company is also cooperating in pilot generating station installations in an effort to obtain the best possible data in which to base a decision on $SO_2$ removal equipment.

In a letter dated August 5, 1971, the Company outlined its position on $SO_2$ control as follows:

> Extensive meteorological studies conducted by North American Weather Consultants, with consultation by Stearns-Roger Corporation and University of Utah, have indicated that under the most adverse meteorological conditions, effluents from the first unit of this plant would not result in ambient pollution levels above the existing State and Federal ambient air standards at the plant, up and down the canyon, and in adjacent towns. We have no reason to believe that present State and Federal ambient standards do not adequately protect health and welfare.
>
> Our plans, however, do set aside adequate space for possible future installation of $SO_2$ removal equipment. This equipment can be designed to permit installation while the unit is in operation with minimal down time in making duct connections; therefore, even though the first unit would be in operation, there would be no difficulty in adding $SO_2$ removal equipment.
>
> Our consulting meteorologists have advised that stack effluent from the ultimate Huntington Canyon plant will not have a significant effect in the Four Corners area.
>
> The Huntington Canyon plant will develop over an extended period of time, giving ample opportunity to monitor air quality, test the predictions, and take advantage of technological advances in pollution control equipment now under development.
>
> At any time available data indicated we would not be complying with air quality standards, we would move immediately to install commercially feasible $SO_2$ removal equipment on the first unit at Huntington Canyon.

In addition, the Company officials do not feel that $SO_2$ removal processes or equipment have yet been developed to a point where they would be justified in making a commitment on a specific removal system in time to permit installation in the first 430 mw unit scheduled to go on line in 1974.

e. Coal Desulfurization

A review of literature and studies on desulfurization of coal indicates that no feasible process has been perfected, even on high-sulfur coal. No information is available on low-sulfur coal desulfurization research. DHEW, in its report, "Report on Control Techniques for Sulfur Oxide Air Pollutants," states:

> Because the degree to which a particular coal can be cleaned varies widely and depends on the amount and distribution of the pyrite sulfur in the coal, quantitative statements about coal cleanability, its costs, and the amount of cleanable coal available cannot be made.

It appears that development of a feasible desulfurization process is too far in the future for initial consideration on the Huntington Canyon Generating Station.

f. Nitrogen Oxide Removal

The Company reports that boilers utilizing a tangential firing pattern will be installed. This type of boiler has proved beneficial in reducing $NO_x$ formation. The Company has also authorized installation of overfire airports in the boiler design, a device that also looks promising in the reduction of $NO_x$. A study of methods of further reducing $NO_x$ in the stack effluent is underway by the Company and its consultants.

g. Contractual Air Quality Requirements

The contract among the Emery Water Conservancy District, the United States, and the Company for the sale of the use of water will require the Company to:

(1) Install equipment designed to remove substantially all particulate material in the stack emission, and operate such equipment so that the amounts of particulates emitted shall not exceed 0.05 pounds per million B.t.u. heat input (ASME measuring procedure), resulting in particulate removal in the range of 98.9 to 99.2 per cent. The Company plans to install particulate removal equipment with an efficiency of 99.5 per cent removal guaranteed by the manufacturer.

(2) Install and operate facilities or equipment to comply with applicable Federal, State, or local laws, regulations, or standards, for the control of oxides of sulfur and nitrogen, and the design of the Huntington Canyon Generating Station will, to the extent practicable, provide for the future installation of any equipment or facilities required to comply with said Federal, State, or local laws, regulations, or standards.

(3) No less often than once every 10 years, representatives of the Company and the Department of the Interior shall meet to review technology in air pollution control equipment and determine the feasibility of installing new or additional equipment, or modifying existing equipment for the purpose of improving performance--taking into account costs and economic feasibility as well as benefits of improved air quality.

h. State of Utah and Federal Requirements for Ambient Air

State of Utah standard for particulates for ambient air and proposed ambient air standard for $SO_2$ are included in the Appendix. Also included in the Appendix are the national primary and secondary ambient air quality standards issued by the Environmental Protection Agency and suggested emission standards for states.

2. Water Quality

a. Diversion and Use

Cooling water for the generating station will be diverted from Huntington Creek at the location shown on the map and drawing in the Appendix. It is estimated that 6,000 - 8,000 acre-feet of water will be consumed annually for a 430 mw unit. The Company plans to use all feasible approaches to minimize the amount of water actually used, including recirculation through cooling towers, where water will be concentrated from 6 to 9 times. The minor amounts of blowdown thus required are expected to be used largely in handling ash.

Evaporation ponds will be provided to dispose of any blowdown water which is not used for ash disposal. These ponds would be sealed to prevent seepage of water through the ground.

The Company will prevent the return of any water to the stream to maintain water quality and comply with Federal and State

standards governing pollution of streams, ground water, or water courses with respect to thermal pollution or the discharge of refuse, garbage, sewage effluent, industrial waste, oil, mine tailings, mine drainage water, mineral salts, or other pollutants.

The Company will install a packaged sanitary waste-water treatment system for the generating station and the coal mine. Utilizing extended aeration, the unit will effect a 90 per cent reduction of suspended solids (SS) and biochemical oxygen demand (BOD). The effluent will then be chlorinated to at least a one (1) p.p.m. free chlorine residual and sent to a holding pond for not less than 4 days. During this time, BOD and SS levels will be further reduced. Holding pond effluent will either be recycled in selected plant processes, or totally evaporated in an evaporation pond.

A statement by the Company outlining its assessment of the effects of water use and control on the fishing and recreational interests in the area is included in the Appendix. As previously stated, the Bureau of Sport Fisheries and Wildlife, the Forest Service, and Utah Division of Wildlife Resources are studying the proposed water use with the objective of developing operational modifications for optimum fishery values.

b. Water Quality Requirements

(1) The proposed contract referred to under "Air Quality Requirements" contains a provision requiring the Company to

comply with all applicable Federal, State, and local laws, orders, and regulations pertaining to pollution of streams, reservoirs, ground water, or water courses with respect to thermal pollution or the discharge of refuse, garbage, sewage effluent, industrial waste, oil, mine tailings, mineral salts, or other pollutants.

(2) Huntington Creek has not yet been classified by the State under its regulations.

3. Ash Disposal and Dust Abatement

Ash characteristics are listed in a table in the Appendix. The estimated 80,000 tons of ash produced annually for a 430 mw unit or 400,000 tons annually at the ultimate 2,000 mw capacity will be disposed of to minimize any air or water pollution in accordance with the following general plan:

a. The fly ash will be transported by a conventional pneumatic ash-handling system to an ash silo. From the silo the ash will be discharged by a dustless unloader onto a conveyor for transport to the ash disposal area located about 4,000 feet southwest of the generating station, which is not visible from the generating station or existing roads. Adequate dust control will be maintained while loading and unloading ash from the transport vehicle.

b. Bottom ash, which will be about 25 per cent of the total ash, will be carried hydraulically to a dewatering tank and

transported to a disposal area.

c. The ash in the disposal area will be covered with earth, or otherwise stabilized to prevent blowaway. The Company will establish a vegetation cover on the area to effectively stabilize the ash against transportation by wind or water to stream channels or other areas where it would be objectionable. The ash disposal area, approximately 4000 feet south of the generating station, is satisfactory for disposal of in excess of 18 million cubic yards of ash, which would be suitable for the life of a 2000 mw generating station. The lower end of the ash disposal area will be diked to provide ponding for precipitation falling on the ash disposal area itself. Runoff coming from above the ash disposal area will be diverted around the ash area.

d. Dust abatement will be achieved through:

(1) Providing landscaping or ground cover for open areas immediately around the generating station.

(2) Paving all roads in the general plant area and switchyard areas.

(3) Surfacing the switchyard area with crushed rock or other material to keep dust down.

(4) Coal will be delivered from the mine to the storage area by a covered conveyor, and the reclaim conveyor will also

be covered. The coal pulverizer will be enclosed to prevent escape of dust, and the generating station will be pressurized to prevent infiltration of any dust into that area. Boilers will be of the balanced draft design.

(5) During construction, dust control will be effected through watering and other palliative measures.

4. Noise

The generating station is being designed to meet the requirements of Walsh-Healey Act, utilizing noise attenuation devices in accordance with the best available technology. Generating Station conveyors will be enclosed. Specifications for fans, transformers, and other major equipment will require noise attenuation. Shielding and control of noise during steam releases will be provided by mufflers, or equivalent devices.

A study of noise levels beyond the generating station boundary will also be conducted. Noise frequency, intensity, and time distribution will be measured. In general, the operation of a generating station does not produce high noise levels far beyond the station area. Ambient noise impacts are not expected for this installation in that no noticeable effects have resulted from other similar company installations.

5. Aesthetics

The switchyard and transmission lines will be located to shield them from public view to the greatest extent feasible. The conveyor

from the mine and the generating station coal storage pile will be located in Deer Creek Canyon, largely hidden from general public view from Huntington Canyon. The conveyor from the storage pile to the generating station is also located for minimum exposure by locating it at the rear of the generating station.

Attractive landscaping of the generating station area will add aesthetic appeal.

The architectural rendering of the generating station included in this Statement gives an idea of how the generating station will look in its natural setting. Architectural features and color schemes will be used so the generating station will blend as nearly as possible with the surrounding landscape.

6. Archaeology

An archaeological survey of the generating station site and reservoir was conducted by the Brigham Young University. No artifacts were found, and no salvage work was found necessary.

7. Radionuclide Release and Trace Elements

An analysis of fly ash from the coal from the Blind Canyon seam made by TRAPELO/WEST, Richmond, California, gave the following results:

TABLE 4

| Peabody Coal - Fly Ash Sample | | | | | |
|---|---|---|---|---|---|
| | | Concentration p Ci/gram dry fly ash | | | |
| TLW Code | Customer designation | $^{226}Ra$ | $^{228}Ra$* | $^{228}Th$ | $^{232}Th$ |
| 305 - 16 | Blind Canyon seam, Deer Creek Mine | 1.5 | 1.7 | 1.7 | 1.6 |

* Note: $^{228}Ra$ assume to be in equilibrium with $^{228}Th$.

The maximum permissible concentrations in air have been established by the U. S. Public Health Service for radium and thorium as 2.0 and 1.0 pico curies per cubic meter, respectively. Emissions in the stack gases due to fly ash not collected by the precipitator will contain radioactive nuclides .001 of those allowable by Public Health Service standards for air. These levels will be further reduced some 6000 times as the stack gases disperse to maximum ambient levels. It is apparent, therefore, that there is no hazard in radionuclide emissions.

An analysis of mercury and other trace elements that might be released during burning of the coal is being performed by the U. S. Bureau of Mines and by Brigham Young University scientists. Included in the Appendix are results from Ledgemont, Illinois Geological Survey and Bituminous Coal Research covering determinations of mercury, chromium, and fluorine.

On the basis of present sampling, approximately 0.4 lbs. to 0.8 lbs. per day of mercury would be emitted from a 430 mw plant at full load. It would appear from TVA calculations of stack dispersions that the maximum hourly mercury concentration would be in the order of .0016 to .0032 micrograms per cubic meter, assuming all mercury in the coal is vaporized. A threshold limit value of 50 micrograms per cubic meter has been set by the American Conference of Government and Industrial Hygienists for industrial exposure over an 8-hour day, 40-hour week. Certainly, mercury in

the air is no problem. It has been theorized that mercury will find its way into streams through precipitation. This will be closely monitored by Brigham Young University and more analytical work performed. However, with the small concentrations, it is highly unlikely that mercury could be a problem.

Water samples analyzed by Brigham Young University have not indicated the presence of mercury in the water passing the generating station; however, mercury does appear in the water downstream of the town of Huntington, and these are thought to be attributable to sewage effluents and field pesticide leaching. Mercury levels below the town of Huntington have been measured at 0.1 to 0.3 micrograms per liter. Analysis of stream and existing reservoir sediments and organism tissues will also be made.

8. Fish and Wildlife

The generating station site is located at the west fringe of public domain adjacent to the Wasatch Plateau and near the mouth of Huntington Canyon. It will utilize a gentle sloping bench area above the canyon bottom. A 36-acre tract of public domain in T. 17 S., R. 8 E., Sec. 6, will be utilized. The majority of the tract is on the bench and is covered by pinon-juniper vegetation. Adjacent land to be utilized in the site is a revegetation project where pinon-juniper has been removed and the land reseeded to shrubs and grasses to benefit wildlife. Lower Huntington Canyon receives heavy deer use during winter months. Some livestock grazing also takes place.

In the generating station area, about 600 acres will be altered for the station proper, the ash disposal area, and the evaporation pond. The pond will be located in habitat of poor value that may be benefited by the presence of water, even of low quality. For mule deer, the most critical aspect of the project is the loss of the land to be occupied by the generating station and the ash disposal area. These tracts are winter range, the habitat element that is limiting for deer. In fact, these facilities will occupy land of the Utah State Division of Wildlife Resources that was bought specifically for big-game winter range. It was of special value because the Division managed the land primarily to support wildlife.

In exchange for the big-game lands to be occupied by the generating station, similar areas will be acquired and deeded to the Utah State Division of Wildlife Resources. In addition, only those areas around the generating station proper will be fenced, leaving the rest of the lands open for free use by the wildlife. In the unfenced part, about 150 acres will be given special range improvement treatment, as will another parcel of public land nearby.

B. Coal Mine and Coal Conveyance

Deer Creek Canyon, in which the coal mine is located, is characterized by steep canyon walls. There is a small, perennial stream which runs the entire length of the canyon.

This area presently receives very light recreational use, and that generally during the fall hunting season. Coal conveyance and storage, along with the generating station development, will encroach quite heavily upon available game range.

Very little, if any, grazing use is made in the area of the coal-mining activity. There is a small possibility that the projected coal mining could intercept springs on which grazing animals or adjacent areas are dependent.

There are no fisheries in the canyon. Contaminants from coal mining and water drainage from the mine will be diverted to a settling basin in Deer Creek Canyon, where coal dust contaminants will be settled out. Water from the settling basin will flow into the small Deer Creek stream which, in turn, will be diverted to the generating station settling basin. Therefore, any contaminants from mining operations would eventually be disposed of in evaporation ponds and not be returned to Huntington Creek.

The immediate area is not rich in archaeological history. Brigham Young University found no locations that were worthy of salvage or protection in its review.

C. Forest Highway Relocation

Relocation of Forest Highway Route 7, as previously described in this Statement, will necessitate crossing several timber types varying from dense aspen stands to scattered stands of Douglas fir, alpine fir, and spruce. The timber presently is more important aesthetically than

economically. Some construction scars will result, but the impact will be reduced as much as possible by judicious routing, rounding and flattening cut slopes where feasible, and seeding and landscaping. Cutting into side slopes will be minimized, and slump and water seepage areas will be avoided wherever possible. The road design includes plans for replacing topsoil on cut and fill slopes, mulching and seeding and landscaping. Construction contracts will include provisions for temporary and permanent erosion control, and for air and water quality control.

The relocated highway will replace the present narrow, winding, dirt-surfaced road with an all-weather road that will greatly improve the access to the recreational and scenic areas of the region.

Initial investigation has been made by the Forest Service for possible archaeological and historical sites along the proposed route. No significant archaeological evidences were found.

D. Dam and Reservoir

The proposed 30,000 acre-foot storage reservoir (Electric Lake) will provide highly desirable water-oriented recreation in addition to serving the direct water needs of the generating station.

More than 26 miles of Huntington Creek, a good trout stream, will be affected by the project. In the reservoir site, about 3.5 miles of the creek (and another mile of minor tributaries) will be inundated. These waters will be replaced with Electric Lake, a 460-acre reservoir with fair potential for trout management. Although an attractive body

of water when filled, its deep, steep-sided shape will not encourage a high biological response. Its greatest value will be its potential for control of downstream flows, and for operation in concert with other reservoirs in the drainage, as discussed later.

Between Electric Lake Dam and the diversion to the powerplant, there are about 19 miles of good trout stream--nearly all of which are in the Manti-La Sal National Forest. This reach has considerable potential for improvement through operation of Electric Lake.

Downstream from the powerplant diversion, Huntington Creek flows 4 miles to the Huntington-Cleveland Canal diversion. It is a moderately good fishing stream to that point. Further downstream, the Creek is frequently dewatered by irrigation diversion and, at best, is very marginal fish habitat. The 4-mile reach will be affected adversely by the diversions to the generating station. Flows will be greatly reduced during the winter season and sometimes may be cut off entirely.

Consumption of water at the powerplant, approximately 7,000 acre-feet initially and about 24,000 acre-feet with full use of water now planned for acquisition or development, will result in changes in the irrigated areas downstream. Part of this use is a conversion from the irrigation water supply. A portion of the irrigation water is not consumed but reappears as return flows. Such return flows are of special interest because they are a substantial part of the water supply to the Desert Lake Waterfowl Management Area of the Utah Division of Wildlife Resources,

a feature of the Emery County Project. It is not believed that the generating station project will significantly affect the Desert Lake area. Measurement of such effects will be difficult because the waterfowl area receives flows from only one segment of the downstream irrigated area served by Huntington Creek flows and the Emery County Project; however, it is possible that a small percentage of the acre-feet consumed at the powerplant will represent depletion in the water supply to the Desert Lake Waterfowl Management Area, especially in years when irrigation water supply is deficient.

The Electric Lake Dam will be equipped with multiple-level outlets so that optimum water temperatures may be maintained downstream, and for quality control to prevent undesirable accumulations of marsh gases in the reservoir waters. It is also planned that continuing coordinated operations will be carried out with the cooperation of irrigation interests, the Forest Service, and the Utah State Division of Wildlife Resources to the end that the best possible fishing stream between Electric Lake Dam and the powerplant diversion may be maintained in Huntington Creek. The acquisition of part of the storage rights in Huntington, Cleveland, Rolfson, and Miller Flat Reservoirs of the Huntington-Cleveland Irrigation Company by the Company will further extend potentials for benefits from coordinated operations. The four reservoirs, all located on the Left Fork Huntington Creek drainage in the national forest, can also be improved as mountain trout fisheries. The maximum size of the reservoirs exceeds 400 acres, but they are in need of larger minimum pools.

The Electric Lake area will be maintained for public recreation, and its fishing will thus be assured to all who wish to use it.

With development of the generating station and facilities, the lake will pose problems in relation to movement of livestock. There will be eight grazing allotments directly affected and numerous others affected to a lesser degree. Established trails and roads leading to these allotments will be inundated. In some instances, it will be difficult to find new routes without crossing additional allotments and increasing trailing distances, but some alternate routes are available.

A considerable part of the private range will be inundated. This land has a high-carrying capacity. When this land is inundated, the overall allotment capacity will be reduced considerably in some cases. With this reduction of available private land and pending adjustments on the Federal range, some allotments may become economically marginal. Very little timber will be disturbed.

One historic site of some significance, the abandoned town of Connelsville and related early-day coke ovens, is found in the area to be affected by the reservoir. Salvage of the important portions of this historic site will be effected if desirable.

The following plant associations occur within the general Upper Huntington Canyon area: Aspen-snowberry, sagebrush-grass, and wet meadow-willow.

The aspen-snowberry association occurs in the better soil and is very productive containing many species of the desirable forage plants. These

plants provide forage for both wildlife and domestic livestock. The aspen trees also provide nesting sites for many birds and also provide protective covering for many species of mammals.

The sagebrush-grass association occurs on the somewhat poorer soils and is less productive; however, it contains a large variety of plant species. Both wildlife and domestic livestock use these sites extensively. The sagebrush plants provide nesting sites for a few birds. They also provide protective covering for some ground-nesting birds and several species of mammals.

The wet meadow-willow association occurs in the canyon bottoms and along the streams. Because of the wet condition of the sites, forage production is high, but plants are less desirable for forage by domestic livestock. This plant association provides good nesting habitat for many birds and also a good protective cover for several species of small mammals.

Electric Lake will block existing access into Upper Huntington Canyon and James Canyon. Access into these two canyons is needed for administrative purposes, for forest users, for a privately-sponsored youth camp, and to a cutoff route to Scofield Reservoir and U. S. Highway 50-6. Alternate routes will be provided.

During periods of drawdown of the reservoir, mud flats will be exposed at the upper end of the reservoir; however, these periods should be very infrequent. The graph in the Appendix shows the projected operation of the reservoir.

E. Fish and Wildlife

In exchange for the big-game lands to be occupied by the generating station, similar areas will be acquired and deeded by the Company to the Utah State Division of Wildlife Resources. In addition, only those areas around the station proper will be fenced, leaving the rest of the lands open for free use by wildlife. In the unfenced area, about 150 acres will be given special range improvement treatment, as will another parcel of public land nearby.

Wildlife resources will be lost as a result of the development of this project, but such is usual in some degree from most modern industrial developments. Measures outlined above, acceptable to the Utah State Division of Wildlife Resources, have been taken to mitigate the loss of big-game winter range in the powerplant area. These measures will be adequate to take care of the present deer herd; however, long-term effects will be negative. Purchase and improvement of other lands are not true replacement of habitat. There will be changes in management objectives and range improvements, but the total acreage of potential wintering area will nevertheless be reduced.

The total effect on fish resources will be to substantially increase productivity, especially if the existing reservoirs on the Left Fork Huntington Creek drainage can be improved, as well as the quality of habitat in Huntington Creek downstream from Electric Lake Dam. The regrettable aspect is the loss of streams in the reservoir site, and the depreciation of Huntington Creek downstream from the powerplant

diversion. Although streams do not furnish as much fishing as lakes, ponds, and reservoirs, they offer special qualities of experience to appreciative fishermen. Water development nearly always detracts from and seldom adds to stream-fishing resources. Utah is increasingly jealous of its remaining streams and tries to prevent unreasonable loss from any type of development.

F. Recreation

This general area currently constitutes one of the more heavily used recreation areas on the Manti Division of the Manti-La Sal National Forest.[7] The present road is narrow, winding, and dirt-surfaced, and closely parallels the stream course through the canyon.

Flat Canyon Campground receives heavy use and, in addition, recreation visitors use many undeveloped sites in this area. There are several inventoried National Forest Recreation sites. Provisions should be made to provide access to these inventoried N.F.R. sites. The main recreation activities engaged in by the visitors to the area are stream fishing, lake fishing, camping, picnicking and aesthetic viewing. Big-game hunters make heavy use of the area during hunting seasons.

The development of Electric Lake will provide for additional recreation opportunities related to water sports.

With development of the Huntington Canyon generating station, there will be increased use on the area. The improved all-weather road will eliminate dust and mud, and improve access so more people can avail

themselves of recreational opportunities and scenic vistas. The relocated road will pass in close proximity to Cleveland and Huntington Reservoirs and shorten the distance to Rolfson and Millers Flat Reservoirs. Cleveland and Millers Flat are good to excellent fisheries. It is anticipated that through coordinated operations with Electric Lake, sufficient water can be retained to provide fish conservation pools in Huntington and Rolfson Reservoirs--both of which, under present operation, are subject to complete drainage.

G. Transmission Line

Both the Company and Government agencies gave careful attention to the location of the 365-mile Camp Williams-Four Corners 345 kv line so that the line would have the least adverse environmental impact possible.

The initial location involved numerous "on the ground" inspections with the Forest Service, Bureau of Land Management, and Indian tribe personnel--particularly in critical areas where public use was a factor.

In the Manti-La Sal National Forest, a team of Forest experts worked nearly a year routing and rerouting, and designated special restricted areas to locate the line to have the minimum environmental impact.

The Bureau of Land Management conducted extensive field investigations along the transmission line route prior to its location, including archaeological investigations on public domain. Significant archaeological values on Alakali Ridge in San Juan County were protected through relocation of a 10-mile length of line. Public values were protected

near Green River, Utah, where a 9-mile section was relocated to avoid conflict with proposed airport expansion. The Museum of Northern Arizona made an archaeological inspection of the route on the Navajo Indian and Colorado-Ute Indian reservations.

The Colorado-Ute Indians also asked that the powerline be moved 5 miles farther west in northwestern Colorado to avoid crossing grazing lands.

Brigham Young University conducted a survey of the transmission line route to assure that no rare plant species were disturbed.

Information meetings with the press and other interested parties were held to keep them informed of the efforts being made to insure environmental protection and to obtain comments on the proposals.

The Bureau of Land Management, in its grant of right-of-way over lands under its jurisdiction, has included the following provisions relating to environmental protection and control:

1. Road access.--Construction of access roads will be held to a minimum. Disturbance of land surface will be restricted to minimize environmental impact.

2. Clearing.--Clearing of vegetation from right-of-way and from access roads will be limited to that necessary to satisfy safety requirements (construction and operational). Scalping of top soil and removal of low-growing vegetative cover will not be allowed except around structures.

3. Historic and archaeological values.--Historic or prehistoric ruins and artifacts are to be identified and salvaged where appropriate.

4. Restoration and cleanup.--All public land areas, where soils and surface materials are disturbed through construction or otherwise incident to the project operations, will be restored to their natural state insofar as practicable to the satisfaction of BLM. Disturbed soil areas which, in the opinion of BLM, are susceptible to successful reseeding will be reseeded by the Company at its expense.

5. Sterilants and herbicides.--No soil sterilants or herbicides for control of vegetative cover within the right-of-way or associated access road areas will be used without prior approval of BLM.

The company made every effort to minimize adverse visual impacts of the transmission towers. Specially designed towers were used in several cases to blend the towers into the landscape in the most pleasing manner possible. Extensive use was made of helicopters to transport materials in lieu of building access roads in the Forest restricted area.

H. Other Impacts

Onsite and downstream water quality may be impaired temporarily because of activities associated with the dam and road construction. Sediment will be contributed to the watercourses in increased amounts. This will result in degradation of the stream habitat. Rehabilitation of the stream habitat will be dependent upon the amount of sediment introduced into it. Debris removal could contribute to sediment in the stream.

The operation and maintenance of the reservoir will present visual impacts with mud-flat areas being visible during periods of water drawdown, which will be infrequent. The upper reaches of the reservoir will be relatively shallow water which will recede rapidly with any drawdown. These impacts can be mitigated by planting water tolerant vegetation along the shoreline below high-water elevation. The reservoir will cover up approximately 4½ miles of stream channel which is very good fish habitat. This particular area is the main fish-spawning area for Huntington Creek. A different type of fishery will be established with the formation of the reservoir by changing it from stream fishing to boat fishing experience.

Construction activity and noises may impair the recreational experience of the public in these areas. Travelers will experience some inconveniences and delays because of construction equipment and rough broken road surfaces during work periods. Campground, picnicking, boating, and fishing will increase after the project is completed, and will require construction of additional facilities to accommodate the public.

## X. ENVIRONMENTAL IMPACT EFFECTS

This section of the Statement considers the effects of the major environmental impacts discussed in the previous section. In evaluating possible adverse effects, it should again be observed that the Company will be required to comply with all applicable Federal and State laws and regulations relating to air and water pollution in the construction and operation of the Huntington Canyon Generating Station and to meet with representatives of the United States periodically; but at least every 10 years to review technological advances in air pollution control equipment to decide upon the feasibility of installing additional equipment or modifying existing equipment.

There is every indication that applicable standards will be met by the Company in its operation of the generating station and appurtenant facilities. Federal and State air and water quality standards are conservatively established, or will be established as studies and research progress at levels that minimize adverse effects and protect health and welfare, consistent with technological capability.

The Company will be required to submit plans to the Secretary of the Interior for his review and comment regarding noise abatement, dust abatement, and ash disposal. These plans will be subject to review at least once every 5 years to take advantage of new technology as it develops.

The effects of the environmental impacts resulting from the forest highway relocation, the dam and reservoir, and coal mining, as discussed in

this section, have been arrived at by studies and assessment of such impacts by the Forest Service, Bureau of Land Management, Bureau of Sport Fisheries and Wildlife, Federal Highway Administration, and Bureau of Reclamation.

The comments and references that follow are intended to be illustrative of current research and opinions on environmental impact effects. They do not necessarily pertain to conditions that will exist in operation of the Huntington Canyon Generating Station. It should be noted that the pollution levels mentioned in the following referenced sources as having adverse effects on human health or vegetation are well above pollution levels predicted for the first unit of the Huntington Canyon Generating Station. They should be considered in context of the impact on the environment section of this Statement. The studies and research that have been conducted in this field to date lead to the general conclusion that control and abatement of possible adverse environmental elements are extremely important. Beyond this general conclusion, individual judgment, experience, and knowledge will come into play in evaluating specific environmental hazards based on the available data, as presented in this Statement, and the referenced material.

## A. Human Health

### 1. Emissions

"The First Annual Report of the Council on Environmental Quality,"[2] in discussing air pollution effects, states:

> Knowledge of the health effects of specific contaminants present in the air is far from complete. However,

> the more overt health effects of several major classes of pollutants are beginning to be defined. Those pollutants are found almost everywhere in the United States.

In considering effects on human health of some of these pollutants, the DHEW report, "Air Quality Criteria For Sulfur Oxides,"[3] states:

> At concentrations of about 115 $\mu g/m^3$ (0.040 p.p.m.) of sulfur dioxide (annual mean), accompanied by smoke concentrations of 160 $\mu g/m^3$, increase in mortality from bronchitis and from lung cancer may occur.

The CEQ report referred to above[2] also states:

> Less is known about the effects on health of nitrogen oxides, which play such an important part in producing photochemical pollution. They have been little studied until recently. However, evidence so far suggests that they may be harmful to human health. A study in Chattanooga, Tennessee, linked very low levels of these oxides in the air to children's susceptibility to Asian flu.
>
> The lowest particulate levels at which health effects have been noted in the United States were reported at Buffalo. The Buffalo study suggests that the overall death rate rises in areas with an annual average concentration ranging from 80 to 100 micrograms per cubic meter. The study also reveals a tie between these levels of particulate matter and gastric cancer in men 50 to 69 years old. A similar association was found in a Nashville study. Particulate levels in this range are found in most major urban areas and are common even in smaller industrial cities.

Stearns-Roger Corporation's Manager of Environmental Sciences Division, in a letter dated August 11, 1961, to the Company, commented on the foregoing quotation as follows:

> Particulate levels in a city are more of a health hazard because they contain more harmful pollutants; for example, most particulates measured in cities contain asbestos brake lining, tire rubber, and lead--none of which should be at significant levels in the rural area of this powerplant.

DHEW, in its report, "Air Quality Criteria for Sulfur Oxides,"[3] concludes:

> Under the conditions prevailing in areas where the studies were conducted, adverse health effects were noted when 24-hour average levels of sulfur dioxide exceeded 300 $\mu g/m^3$ (0.11 p.p.m.) for 3 to 4 days. Adverse health effects were also noted when the annual mean level of sulfur dioxide exceeded 115 $\mu g/m^3$ (0.04 p.p.m.).

In contrast, M. D. Battigelli, M.D., in an article in the "Journal of Occupational Medicine," September 1968, "Sulfur Dioxide and Acute Effects of Air Pollution,"[4] states:

> In summary, the search for an acceptable rationale, or for reasonable evidence documenting a toxicological relevance of $SO_2$ levels, as these are encountered in urban air pollution, has thus far failed. If urban pollution has a measurable effect on the health and disease of exposed populations, as it appears to have, on the basis of available information, this phenomenon does not appear to involve sulfur dioxide in its mechanism.

In the same hearing, Mr. Nelson quoted from a statement on May 18, 1967, by Dr. E. J. Cassell, Mt. Sinai School of Medicine, New York City, to the Muskie Subcommittee on Air and Water Pollution:

> There is no proof that $SO_2$ alone, or at levels anywhere near those found in urban atmospheres, has any adverse effects on man.

DHEW, in its publication, "Air Quality Criteria for Particulate Matter,"[5] concluded:

> Under the conditions prevailing in areas where the studies were conducted, adverse health effects were noted when the annual geometric mean level of particulate matter exceeded 80 $\mu g/m^3$.

2. Dust

Airborne dust will add to the air pollutant problem in minor respects during construction, but the contractors will be required to take measures to keep this to a minimum. The Company will also take measures to prevent blowing of ash from the ash disposal area. The Company will establish a vegetation cover on the ash area to effectively stabilize the ash against transportation by wind or water to stream channels or other areas where it would be objectionable. The lower end of the ash disposal area will be diked to provide ponding for precipitation falling on the ash disposal area itself. Runoff coming from above the ash disposal area will be diverted around the ash area.

3. Noise

Noise levels in the generating station are not expected to be in excess of any modern generating facility of this type, and measures are being taken to minimize noise, as discussed in this Statement. The isolated location of the generating station will prevent noise impact on heavily populated areas.

4. Radionuclides

Studies to date indicate that radionuclide releases will not pose a health hazard. Refer to the section of this draft Statement on Radionuclide Release and Trace Elements for data on this subject.

5. Leaching From Ash Disposal Area

Some questions have been posed about the possibility of leaching from

the ash disposal area into the ground water, and the consequent hazard if such leaching occurred. Soil tests indicate very low percolation rates in the general area. The Company will take whatever action is necessary to prevent adverse effects from this source.

B. Vegetative Effects

The generating station site and storage reservoir (Electric Lake) face the boundaries of the Manti-La Sal National Forest on the west, southwest, and northwest, where the principal vegetation consists of fir, pine, quaking aspen, oak brush, with scattered sagebrush flats. The area to the east, south, and northeast of the generating station site changes from typical juniper, pinon growth to desert-type vegetation, such as sagebrush, rabbit brush, etc., as the distance from the generating station site increases.

"The First Annual Report of the Council on Environmental Quality,"[2] states:

> At sulfur oxide levels routinely observed in some of our cities, many plants suffer a chronic injury described as "early aging." Nitrogen dioxide produces similar injury symptoms, and seems to restrict the growth of plants even when symptoms of injury are not visible. Ozone, a major photochemical oxidant, is a significant threat to leafy vegetables, field and forage crops, shrubs, and fruit and forest trees--particularly conifers. The damage from ozone in minute quantities can be great. Extended ozone exposure to 0.05 parts per million can reduce a radish yield 50 per cent.

The DHEW publication, "Air Quality Criteria for Sulfur Oxides,"[3] reports with respect to sulfur dioxides:

> Adverse effects on vegetation were observed at an annual mean of 85 $\mu g/m^3$ (0.03 p.p.m.).

The University of Utah study referred to herein includes fumigation trials of the effect of $SO_2$ on vegetation indigenous to the plant area.

Quoting from the hearings of the Utah Air Conservation Committee,[4] Harris M. Benedict, an employee of Stanford Research Institute, testified:

> There have been many studies conducted on the effects of sulfur dioxide on plants. Some of these are field observations, and some are carefully controlled laboratory fumigation studies. These studies have generally suggested that leaves of sensitive plants, such as alfalfa and white pine, may develop markings after eight hours' exposure to .24 to .30 p.p.m. Probably the most inclusive and most thorough of such studies involving field and laboratory results are the investigations of Thomas, O'Gara, Hill, and coworkers conducted right here in Utah. As a result of these studies, some 100 species of plants were ranked according to their sensitivity to sulfur dioxide. The most sensitive plant found, alfalfa, was then used in highly refined studies to determine the time of exposure required at various concentrations to mark the leaves and to reduce or interfere with photosynthesis.
>
> The results showed that unless the leaves were marked, no permanent effects on the growth of the plant occurred. Although during the exposure itself, the rate of photosynthesis might be reduced; however, the photosynthetic rate quickly returned to normal when the exposure to sulfur dioxide was stopped, unless some of the leaf tissue was killed.
>
> The results of these numerous experiments have received worldwide acceptance and have generally been corroborated by Dr. Morris Katz (Ind. & Eng. Chem. 41:2450-2465).
>
> More work is needed to substantiate synergistic responses, especially in the higher altitude, low humidity climates of the Western States, since it is known that climatic conditions markedly affect the response of vegetation to air pollutants.

Natural vegetation along the proposed roads and coal transportation system will be replaced at least temporarily by introduced grasses and shrubs. Complete re-establishment of natural vegetation will be a

long-term process. The reservoir and road relocation will cover up considerable forage that is presently used by domestic and game animals. This loss will not be retrievable. The use of salt and/or coal dust during the winter months on the proposed road relocation may be detrimental to roadside vegetation and stream quality.

C. Visibility

"The First Annual Report of the Council on Environmental Quality,"[2] comments on visibility effects of air pollution to this effect:

> Particulates, however, are the major villain in reducing visibility. Particles (ash, carbon, dust, and liquid particles) discharged directly to the air scatter and absorb light, reducing the contrast between objects and their backgrounds. Particles are also formed in the atmosphere by photochemical reactions and by the conversion of sulfur dioxide to sulfuric acid mist. Wherever sulfur pollution is significant, which is wherever large amounts of coal and oil are burned, visibility diminishes as relative humidity rises.

The DHEW publication, "Air Quality Criteria for Particulate Matter,"[5] states under the conditions set forth in the studies referenced therein:

> With a typical rural concentration, such as 30 $\mu g/m^3$, the visibility is about 25 miles; for common urban concentrations, such as 100 $\mu g/m^3$ and 200 $\mu g/m^3$, the visibility would be 7.5 miles and 3.75 miles, respectively.

With respect to sulfur dioxide concentrations, the DHEW publication, "Air Quality Criteria for Sulfur Oxides,"[3] states:

> Visibility reduction to about 5 miles was observed at 285 $\mu g/m^3$ (0.10 p.p.m.).

This does not, however, appear to be a typical case. The following graph taken from the same publication illustrates the effect of relative humidity, which would be low at the site of the Huntington Canyon Generating Station.

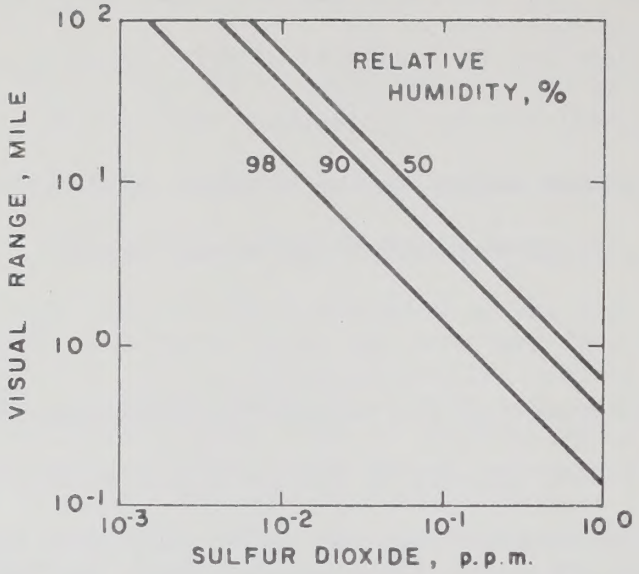



Fig. 1-5 Calculated Visibility (Visual Range) in Miles at Various Sulfur Dioxide Concentrations and at Different Relative Humidities in New York City.

Stearns-Roger Corporation's Manager of Environmental Services Division, in a letter dated August 11, 1961, to the Company, commented as follows on the foregoing graph:

> Figure 1-5 is taken directly from page 14 of the Criteria Document for Sulfur Dioxide without recognizing the procedure used to arrive at the information. The procedure was this: A correlation was made based on data taken in New York City with an assumed ratio between the levels of $SO_2$ and particulates. Specifically, a ratio of 1200 $\mu g/m^3$ particulates to one part per million $SO_2$ in the air was assumed. This ratio came from data actually taken in New York City and probably represented reasonably well data reported in 1964 and 1965 in that city. Measurements were then made of visibility over a wide range of $SO_2$ levels, and these data were correlated. Finally, equations were developed on the basis of sulfuric acid mist concentrations and visibility range. A second correlation between sulfur dioxide and sulfuric acid mist concentrations with parameters of relative humidity was made. These were then put together mathematically, and the sulfur dioxide levels vs. visibility range diagram shown in the report developed. There is no evidence to indicate this calculated relationship will hold under other circumstances. Further, it is based on the high particulate to $SO_2$ ratio measured in New York in 1964 and 1965.

D. Cumulative Impact Considerations

Major electric generating stations under construction, planned, or in operation in parts of Utah, Nevada, Arizona, New Mexico, Colorado, and Wyoming are shown on the map in the Appendix. Ultimate planned capacity of certain of these generating stations is:

| | | | |
|---|---|---|---|
| Kaiparowits | (in planning stage) | - ultimate capacity | 5,000 mw |
| San Juan | (under construction) | - " " | 1,690 mw |
| Navajo | ( " " ) | - " " | 2,300 mw |

There are no known future industrial and urban developments in the immediate area of the Huntington Canyon Generating Station that would add significantly to air pollution. Any future developments would have to take into account existing developments and make plans to maintain air quality standards.

Much attention is being given to environmental protection in the southwest United States by the Department of the Interior and other agencies. The Secretary of the Interior announced on May 7, 1971, the initiation of a comprehensive examination of the development of electrical power in the southwest United States, which will include an assessment of environmental impacts.

The meteorological consultants for the Four Corners, San Juan, Mohave, Navajo, and Huntington Canyon Generating Stations have recently completed a report assessing the cumulative impact of these generating stations on air quality in the Colorado River Basin.[10] The conclusions and recommendations of this report follow:

## 1. Conclusions and Recommendations

This study was a joint effort by several separate consulting organizations to assemble a unified report concerning the total impact on the environment of the southwest United States by the large coal-fired powerplants in this region. The report restricted its attention to only those plants which were (1) already in operation, (2) under construction, or (3) to those plants for which definite plans have been made. (Note: The generating stations considered in this study are listed hereafter.)

The major effort was an attempt to describe the meteorology and possible air movement or exchange during periods of restricted (or limited) dispersion conditions. These conditions have been referred to by several names--both within this report and in other reports related to this area. Perhaps the most commonly used are "severe capping conditions" or "stagnation." No rigorous definition of these conditions were presented; however, an attempt was made to describe the meteorological conditions necessary for stagnation.

Most cases of stagnation refer to a lack of a gradient dominated flow at the surface, with a resultant zero or small transport of air at the surface. Due to the strong influence of local winds (i.e., mountain-valley winds) in this region, the application of commonly accepted stagnation conditions, as applied to more level parts of the United States, does not produce realistic results. An effort was made to describe this mountainous region of the United States considering both meteorology and terrain.

The specific question that this effort addressed was the possibility of an interaction between the various major powerplants in the area under limited dispersion conditions. The problem could be resolved by explaining the possible interaction of the various wind drainage patterns that dominate the local air flow in this region. Combining the meteorological and air quality data of several years of study by each consulting group into a coherent picture of the meteorology of the Colorado Drainage Basin, and coupling this with the terrain features, we feel that several statements can be made about the interaction of the powerplants in this area.

Out of this effort came the concept of "air sheds" described elsewhere in this report. Three important points need to be kept in mind about this study. The first is related to the lack of good, long-term data in this area describing the local conditions. The second follows from the first in that only a general picture could be drawn for this area on the basis of the data available. The third is that the conclusions stated below relate to the so-called stagnation condition, which will potentially result in the worst air pollution episodes and is not necessarily valid for flow patterns dominated by gradient flow conditions.

The conclusions reached by this study group are:

a. Based on the combined arguments of local winds, terrain effects, and professional judgment, it is concluded that the area in question can be broken into several gross air sheds.

b. Evidence indicates little significant meteorological interaction between air sheds during stagnant conditions.

c. On the basis of an air shed concept, it is concluded that there is no significant interaction of powerplant effluents between these gross air sheds (the Four Corners and San Juan powerplants are considered as a single source for the purpose of this report).

d. During the previously postulated 23-day stagnation period (January 4-27, 1968), the area was ventilated three times. Studies have indicated no large area air pollution buildup under extended periods of stagnation due to the environment's pollutant removal processes.

e. Meteorological studies indicate that stagnation may be as long as 13 days in this area; however, each separate air shed should be evaluated further since the degree of stagnation and its consequences will vary between the different locales.

TABLE 5

GENERATING STATIONS CONSIDERED IN JOINT METEOROLOGICAL STUDY

| Plant | Unit No. | Size (mw) | Date of Oper. | Design % Eff.*1 Part. | Cont. | Particulate Tons/Day | $SO_2$ Tons/Day | $NO_x$ Tons/Day |
|---|---|---|---|---|---|---|---|---|
| Four Corners | 1 | 175 | '63 | 99.2 | | | | |
| Four Corners | 2 | 175 | '63 | 99.2 | | | | |
| Four Corners | 3 | 225 | '64 | 99.2 | | 10*2 | 65*2 | 66*2 |
| Four Corners | 4 | 755 | '69 | 99.2 | | 10 | 85.5 | 87 |
| Four Corners | 5 | 755 | '70 | 99.2 | | 10 | 85.5 | 87 |
| Mohave | 1 | 755 | '71 | 98.7 | | 6.5 | 78 | 72 |
| Mohave | 2 | 755 | '71 | 98.7 | | 6.5 | 78 | 72 |
| San Juan | 1 | 330 | '73 | 99.5 | | 2.95 | 65.5 | 31.9 |
| San Juan | 2 | 330 | '77 | 99.5 | | 2.95 | 65.5 | 31.9 |
| Navajo | 1 | 750 | '74 | 99.5 | | 2.42 | 70 | 68 |
| Navajo | 2 | 750 | '75 | 99.5 | | 2.42 | 70 | 68 |
| Navajo | 3 | 750 | '76 | 99.5 | | 2.42 | 70 | 68 |
| Huntington | 1 | 430 | '73 | 99.5 | | 1.4 | 44.8 | 36.0 |
| Huntington | 2 | 430 | '78 | 99.5 | | 1.4 | 44.8 | 36.0 |

*1 Design efficiency as of January 1, 1977 *2 Total 3 units

The Joint Meteorological Report is presently being reviewed by meteorologists from the Bureau of Reclamation, TVA, EPA, and National Oceanic and Atmospheric Administration. Comments are being sought from a broad base of Federal, State, and non-Governmental interests. This meteorological report will be distributed with the consolidated Environmental Statement on the Navajo Project due for wide circulation and review soon.

E. Other Effects

The proposed Forest Highway relocation route will provide improved access to a large area for recreational pursuits, hiking, camping, fishing, and water sports associated with the new Electric Lake. The road is planned to provide attractive scenic vistas of the new lake, and open other areas of beauty providing scenic views which are presently almost inaccessible.

The construction will make some new cut scars, but the design is planned to reduce the impact by rounding and flattening slopes where feasible and by replacing topsoil, seeding, and landscaping. Some of the steeper backslopes and cuts through rock will have what may be considered an adverse impact.

There are no parks, historic or cultural sites which will be affected along the road relocation route. The new location will provide the potential for the creation of a number of camping and picnicking developments on attractive sites near the new road.

The road as proposed is considered to provide a pleasant, safe-driving experience and is planned to be a good neighbor. Extensive materials investigations along the route have not revealed any evidence of archaeological or Paleontological resources; however, Federal Highway Administration procedures are such that should resources of either kind be encountered during construction, the necessary study and salvage operations can be instituted so that the resources can be preserved.

Established trails and roads leading to grazing allotments in the vicinity of Electric Lake will be inundated, as will a considerable part of the private range, resulting in some degradation of grazing.

## XI. ALTERNATIVES TO HUNTINGTON CANYON GENERATING STATION

### A. Alternative Location

The basic reasons for selecting the particular location were mentioned previously in this report. Economic and institutional factors related to the availability of coal and water favored the present location; therefore, movement of the site would probably add to the cost of the generating station without any lessening of the environmental impacts. In fact, if it were located in a metropolitan area, there would be an increase in the per capita influence of pollutants, even though pollutants are kept to a minimum.

The location of this generating station in a remote area has the advantage of reducing the congestion in a major load center, where the generating station might otherwise be placed. The cost of transmission is more than offset by the savings realized by not having to transport fuel to a load center. Also, the environmental impacts of additional rail loading, unloading, and transportation are eliminated. Location in some other remote area would probably not significantly alter potential environmental effects.

### B. Several Smaller Plants

Single-plant construction is preferable to multiplant because of economic considerations. Control of flue gas emissions from a large plant will likely attain slightly better efficiency and lower unit costs than the accumulated efficiency of two or more smaller plants with the same total capacity. Some dispersion benefits might accrue to the several smaller plants, but the location of Huntington Canyon Generating Station

appears favorable from a dispersion viewpoint.

The economy of improved air pollution equipment for air contaminants, such as $SO_2$, might be better at one large plant. The installation of many small plants would require significant increases in right-of-way requirements for transmission lines, access roads, coal-hauling routes, plantsites and substations, and ash disposal areas.

C. Curtailment of Use of Electrical Energy

Many people point to the tremendous increase in use of electrical energy in the United States, and the alarming prospect that this growth represents in adverse environmental effects. Mr. Charles F. Luce, Chairman of the Board of Consolidated Edison Company, in a talk at Indiana University of Pennsylvania, October 19, 1970, stated:

> Nationally, population growth has dropped to about 1 per cent per year, but electric loads are still going up about 8 per cent per year. Even if we achieved zero population growth, the demand for energy would continue approximately to double every decade.

Action has been advocated to slow this great expansion in use of electrical energy so that construction of powerplants could be reduced. Following this line of thinking leads to consideration of another of the alternatives--not to build this generating station. As pointed out by the Company, however, it would then be unable to serve its customers; therefore, this is not considered an acceptable alternative. Curtailment of electrical energy use involves major considerations of national import. Consumption of electrical energy in the United States by class of customer in 1968 was approximately as follows:[6]

| | Per cent | Millions of KWH |
|---|---|---|
| Residential | 33 | 380,460 |
| Commercial | 22 | 257,405 |
| Industrial | 45 | 519,145 |

This breakdown of electric energy consumption points out the complex factors that would be encountered by limitations in use of electricity. Some industrial leaders share public concern about encouragement of consumption. The Chairman of the Board of Consolidated Edison, in the talk referenced above, stated, in talking of the problems facing the utility industry:

> But I believe that the problems also must be approached from the other end--from the consumers' end--and that a National policy of electric energy conservation will become necessary.

There is very good argument that attempts to reduce power consumption would have the reverse effect intended; for example, quoting John W. Simpson, President of Westinghouse Power Systems Company, in a talk on February 19, 1971, to the St. Louis Electrical Board of Trade:

> Immense amounts of electricity would be needed in the future to insure social and economic growth and to clean up environmental pollution. To freeze or attempt to cut back on power consumption would have disastrous consequences that would dwarf our present environmental problems by comparison. Producing electric power causes certain environmental effects, but those who would reduce power output and consumption have not considered the environmental effects of not producing enough electrical power. Population growth, higher living standards, economic expansion, and agricultural production will cause increasing demand for electric power and, in addition, new uses for electric power, including new technologies to clean up pollution and treat wastes which will create further demands for electricity.

D. Substitute Fuels

Fuels, other than coal, for a generating station of the size required

initially to meet projected loads were investigated by the Company with the following conclusions:

1. Nuclear.--Extensive investigations proved that nuclear energy would be highly uneconomical for a generating station with the small initial capacity required by the Company. It was also recognized that nuclear energy also involved extensive environmental considerations.

2. Oil and gas.--Investigations showed that there were no long-term supplies that were available.

3. Gasification.--The technology is not far enough advanced to make considerations of this process feasible at present.

4. Geothermal.--Although the Company is interested in utilization of possible geothermal resources in its service area, investigations have not proceeded to the point that large capacity geothermal units could be committed. Extensive drilling and testing of possible geothermal sources will be necessary to determine if a long-term supply is available, and if this source of power is economically feasible.

The Company will continue to evaluate substitute fuels as additional generating units are planned.

## XII. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The use of the coal resources of the country for generation of energy is controversial as it relates to short-term and long-term use or conservation of natural resources.

The destruction of vegetation that will result from direct construction activities is not serious.

Although the National primary and secondary air quality standards define air quality judged necessary to protect the public health and welfare (including vegetation) with an adequate margin of safety, the long-term effects may still be held at this time to be somewhat uncertain. At least at this point in time it would appear that long-term effects on vegetation would not be serious so long as existing or proposed standards are met.

Concern has been expressed about permanent atmospheric changes that might be attributable to stack emissions; but the science dealing with this subject cannot predict what the changes might be.

Some tradeoff of values appears inevitable if the energy demands of the Nation are to be met. The use of coal for generation of electrical energy seems to be imperative for many years in the future. Although there are many advocates of a policy to decrease the use of energy, the best current projections show that electrical energy demands will continue to increase. Until there are advances in technology, there

will be some environmental impact effects associated with supplying this demand.

Reduction of visibility and damage to scenic values from chemical reaction of emissions have been mentioned as having possible long-range adverse effects, but in view of the Company's commitment to comply with air quality standards, these effects are expected to be minor.

Direct economic benefits from the jobs created by the generating station and the tax base will occur in an area that needs economic growth. Many proponents of the generating station see this as offsetting risks involved from the projected environmental impact.

Long-term enhancement of recreational values should occur. Access by road to public lands will be greatly improved.

## XIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The principal resources to be consumed will be the estimated 1 million tons of coal to be used annually for each 430 mw unit.

Approximately 150 acres of national forest land will be taken out of forage or timber production by the road relocation. Use of the land inundated by Electric Lake will be lost for forage production, and about 4.5 miles of choice stream fishing and the propagation potential of this reach of stream.

## XIV. PUBLIC MEETINGS AND INFORMATION MEDIA

General meetings were held June 5, 1970, and December 2, 1970, to discuss the environmental aspects of the generating station. These meetings were attended by Federal and State officials, university representatives, and representatives of companies working with Utah Power & Light Company. Lists of those attending these meetings are included in the Appendix. Public meetings were held at Castle Dale, Utah, March 12, 1971, and in Salt Lake City, Utah, on April 28, 1971. Numerous meetings were held with Federal, State, local officials, and individuals to discuss various phases of station plans and designs, and transmission line routing and construction.

The Company has made information on the generating station and its environmental protection plans widely available to the press, radio, and TV stations.

# REFERENCES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2 "Environmental Quality," The First Annual Report of the Council on Environmental Quality - Transmitted to the Congress - August 1970

3 "Air Quality Criteria for Sulfur Oxides," U. S. Department of Health, Education, and Welfare - January 1969

4 As quoted by K. W. Nelson in the transcript of the public hearing before the Utah Air Conservation Committee and Utah State Board of Health on proposed air quality standards and regulations on sulfur dioxide and visible emissions, Salt Lake City, Utah - January 9, 1970

5 "Air Quality Criteria for Particulate Matter," DHEW, PHS - January 1969

6 "Statistical Abstract of the U. S. Department of Commerce, Bureau of the Census" - 1970

7 Environmental Analysis Report - Utah Power & Light Company - Deer Creek Coal Mine and Coal Transportation System, Huntington-Fairview Forest Highway #7 Relocation, Electric Lake Dam and Reservoir - Department of Agriculture, Forest Service - April 27, 1971

8 Report Number 706-A - North American Weather Consultants -"A Meteorological Evaluation of Dispersion of Stack Effluent From the Proposed Powerplant in Huntington Canyon, Emery County, Utah - Vol. 1." - April 1971

9 Monthly Progress Report, "A Study and Review of Vegetation, Ecological Conditions, and Air Quality at the Huntington Canyon Powerplant Location," Utah Power & Light Company, Prepared by Utah Engineering Experiment Station - Center for Environmental Studies - University of Utah - February 1971

10 Joint Meteorological Report - Prepared for Navajo Project, Mohave Project, San Juan Project, Four Corners Project, Huntington Canyon Project - Contributors: Dames & Moore, North American Weather Consultants, Loren W. Crow, Consulting Meteorologist; Dr. Robert G. Larsen, University of Utah; Dr. Clyde Hill, University of Utah - September 1, 1971

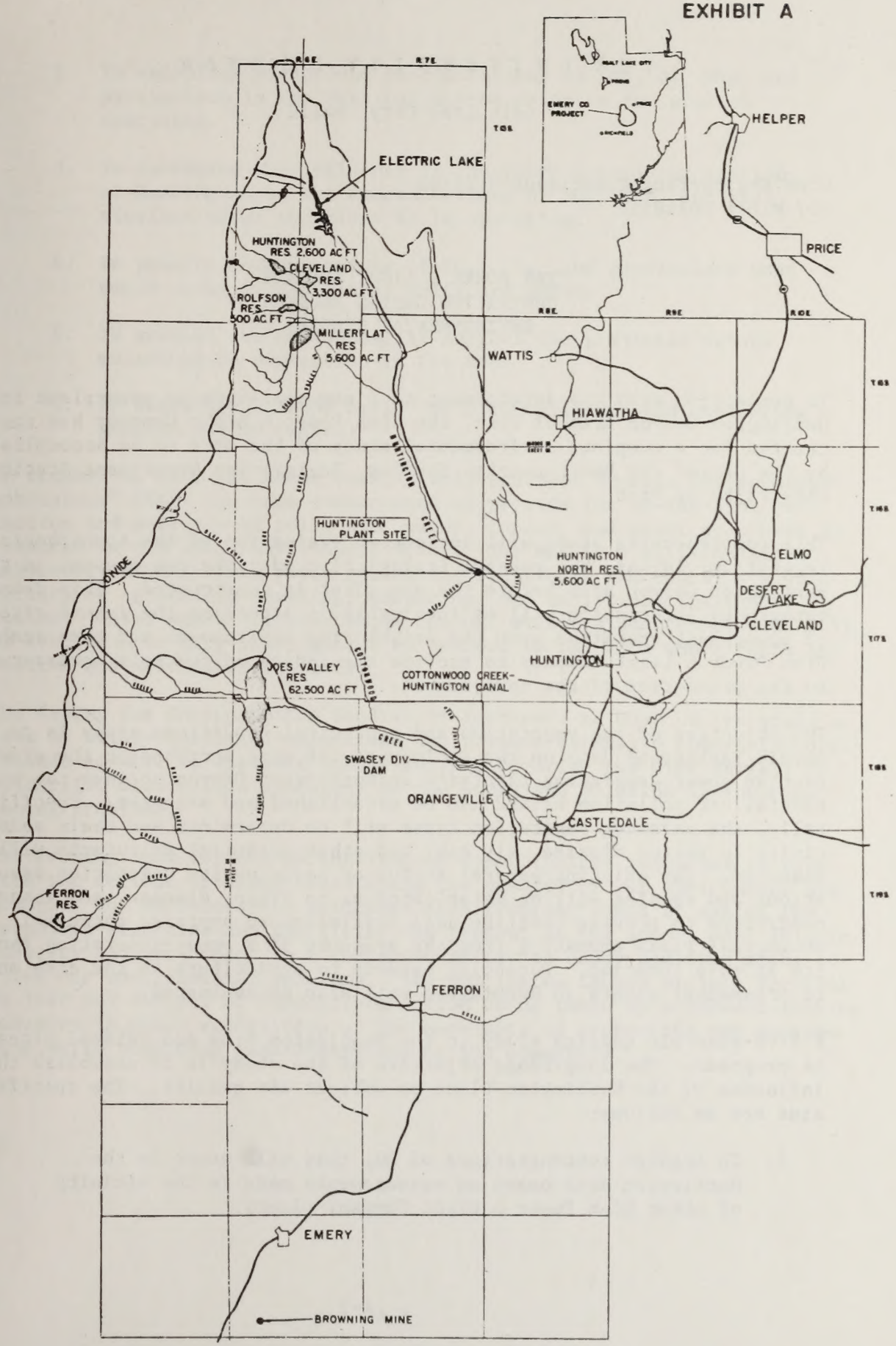
# A P P E N D I X

# A P P E N D I X

(Cont'd.)

# HUNTINGTON SE STATION

EXHIBIT A



THE UNIVERSITY OF UTAH

Salt Lake City 84112

Utah Engineering Experiment Station
207 Mines Building

UTAH POWER & LIGHT COMPANY
HUNTINGTON CANYON PROJECT
ENVIRONMENTAL STUDIES

In connection with the development of a new coal-burning powerplant in the Huntington Canyon area of Utah, the Utah Power & Light Company has contracted for a complete environmental study of the area to be accomplished by the Center for Environmental Studies, Engineering Experiment Station, University of Utah.

This comprehensive study will include an evaluation of the Atmospheric, Vegetation, Animal, and general Ecological conditions now present in the Huntington Canyon area before the new plant is constructed. This detailed background information will be invaluable in assessing the future effects of powerplant operation upon the neighboring environment and thus enable Utah Power & Light Company to provide the indicated controls necessary to the protection of the environment.

The objective of the vegetation and ecological conditions study is to obtain background data on the ecology of the area surrounding the prospective power-generating plantsite in Huntington Canyon so that the potential air pollution hazard can be established and assessed. Specifically, the existing vegetation types will be determined and their sensitivity to sulfur dioxide, fly ash, and other potential pollutants will be assessed. The existing general status of major native vegetation associations and species will be established as to vigor, disease, and insect conditions to provide baseline data sufficient to appraise potential ecological risks emanating from the presence of a power-generating facility at this location. Potential hazards to agriculture in the area and to ornamental plants in Huntington will also be evaluated.

A five-year air quality study in the Huntington area and related sites is proposed. The long-range objective of the study is to establish the influence of the Huntington Plant on ambient air quality. The specific aims are as follows:

1. To predict concentrations of $SO_2$ that will occur in the Huntington area based on measurements made in the vicinity of other Utah Power & Light Company plants.

2. To establish background concentrations of $SO_2$, $O_3$, $NO_x$, and particulate in the Huntington area prior to the station operation.

3. To determine the influence of the power generating station at Huntington on the concentrations of $SO_2$, $NO_x$, and particulate after the plant is in operation.

4. To predict concentrations of $SO_2$, $NO_x$, and particulate that would occur as additional units are added.

5. To predict the influence, if any, of the projected future emissions on vegetation in the area.

6. To establish a sound basis for a surveillance and monitoring program in the future.

In connection with the above work, a well-equipped "Mobile Environmental Laboratory" (MEL) has been constructed to provide for on-the-spot collection and analysis of soil, air, water, insect, and plant specimens as required in the total environment study. The MEL is a self-contained laboratory with its own power-generating facilities and contains a wide variety of scientific sampling, measuring, and analytical instrumentation. Under normal circumstances the MEL with trained technicians will be available on very short notice to proceed to the area where tests are desired and accomplish its work.

The Center for Environmental Studies is fortunate to have on its staff a team of highly qualified scientists who possess extensive industrial backgrounds as well as academic qualifications covering the wide variety of scientific disciplines necessary to the study and solution of environmental problems.

The growing need for the marshalling of technological resources to cope with the serious problems threatening the quality of our environment has prompted the University to structure this program, aimed at making the extensive expertise and facilities now present at the school available to industry and government in a concerted effort to study and find means to solve our environmental problems. The Huntington Canyon project for UP&L is just one example of responsible action being taken by a forward-looking industry in their recognition of the necessity of protecting our environment while providing needed services to the community.

## EXCERPT FROM UNIVERSITY OF UTAH ENVIRONMENTAL STUDY

### INTRODUCTION

Under the sponsorship of the Utah Power & Light Company, the Utah Engineering Experiment Station, in cooperation with the University of Utah Center for Environmental Studies, the College of Mines and Mineral Industries, and the Department of Biology, has undertaken an environmental research project in connection with the proposed construction of a coal-burning powerplant in the Huntington Canyon area of Utah.

Work on this comprehensive total environment study project was begun at the end of July 1970. This first quarterly progress report presents a detailed description of the work accomplished during the period indicated.

A report will be prepared at the conclusion of each three months of activity, detailing the data obtained and results of investigations accomplished during the period. Interim reports will be issued as necessary in order to present particularly significant findings requiring immediate action.

### PROJECT ACTIVITY

During the period indicated, work was accomplished in the Air Quality Study and Survey of Vegetation phases of the project. This activity is summarized below for each phase of the project.

### A. AIR QUALITY STUDY
(Dr. A. Clyde Hill)

The air sampling portion of the study was put into operation during August and September of 1970. A mobile environmental studies laboratory was assembled and equipped to provide onsite sampling and analysis and to greatly facilitate data collection. The mobile unit is equipped with the following instrumentation:

a. A 2500-watt gasoline-operated power generator
b. Sulfur dioxide recorder
c. Recording nephelometer
d. Ozone recorder
e. Infrared spectrophotometer
f. Nitrogen dioxide sampler

Space within the trailer is available for additional instruments should future needs arise.

Sampling sites were explored and established, and field help chosen to accomplish sample collection work. These sites are shown on the map provided (Exhibit 1) and described in detail (Exhibit 2).

Dust fall jars and sulfation plate stations were established during the first part of August. Two additional sulfation plate stations were established at the higher elevations during September. For the location of these stations, see the map (Exhibit 1).

Glass fiber filter sampling stations were established at two locations on August 6, and at a third location on August 20. One station is located in Huntington and two are in Huntington Canyon (see map, Exhibit 1).

Ozone was measured in Huntington Canyon and in Huntington during part of September.

An $SO_2$ instrument was operated periodically in Huntington and in Huntington Canyon during September.

The recording nephelometer was operated in Huntington during much of September, and it was run in Huntington Canyon to a limited extent.

$NO_2$ was measured at Huntington and in Huntington Canyon during two periods and on top of the mountain area on one occasion during September.

Sulfur dioxide was measured by collecting manual samples at Castle Gate, Huntington, and in Huntington Canyon during one period in September.

Milipore filter samples were collected in Huntington and in Huntington Canyon during September.

The Andersen sampler was operated in Huntington Canyon during September.

## B. BACKGROUND SURVEY OF VEGETATION AND ECOLOGICAL CONDITIONS
(Dr. Michael Treshow)

The following days were spent on the Huntington Canyon powerplant project: July 28-29, August 16, and September 9. Accomplishments during this period included:

1. Selection of sites for pre- and post-operational ecological studies.

2. Inspection of vegetation in the Canyon area including several side canyons from Huntington to areas up the canyon 15 miles above the project site. This included major crops and orchards as well as native species.

3. Cataloguing and photographing existing disease and insect conditions throughout the area.

4. Preparation of an inventory of plant species growing in the area in the fall. The most dominant species will be fumigated with $SO_2$ to determine their sensitivity.

5. Observations were made of sites where air sampling stations were placed, and a familiarity gained with this segment of the program.

## EXHIBIT NO. 2

## DETAILED DESCRIPTION OF AIR SAMPLING SITES

| Station | Location |
|---|---|
| HL | Huntington - Geo. Lister residence, corner 1st N. & 1st E. |
| HR | Huntington - Sharleen Rowley residence, corner 4th N. & 1st W. |
| HH | Huntington - Center Street midway between 2 W. & 3 W. |
| HM | Huntington - Corner of 2 S. & 1st E. |
| CD | Castle Dale - George Magnuson residence, 1 block N. of LDS Church |
| LC | Lynn Collard Farm, 4.5 miles up canyon from intersection of Highways 10 & 31 |
| RF | Homer Rowley Farm, 5 miles up-canyon from intersection of Highways 10 & 31 |
| SF | Stump Flat, 1¼ miles southwest of Homer Rowley Farm |
| MO | McPherson Orchards, 6 miles up-canyon from intersection of Highways 10 & 31 |
| FC | Fish Creek Canyon Road, ½ mile from intersection of Highway 31, under telephone line |
| DC | Deer Creek Canyon, 2 miles above intersection of Highway 31 |
| MC | Meetinghouse Canyon Road, under powerlines |
| BC | Bear Creek Canyon, under powerlines |
| CP | One-quarter mile S. of mouth of Trail Canyon under telephone lines |
| TC | At confluence of Huntington & Trail Canyons |
| FH | At confluences of Fork Huntington Creek & Huntington Canyon, 200 yds up east slope |
| BH | Harrison Farm, 6 miles up-canyon from intersection of Highways 10 & 31 |
| GW | At head of Grimes Wash, 4 miles West of Stump Flat |

EXHIBIT NO. 2 (Cont'd.)

DETAILED DESCRIPTION OF AIR SAMPLING SITES

| Station | Location |
|---|---|
| MF | At head of Middle Fork of Grimes Wash, 3 miles west of Stump Flat |
| WC | At head of Whetstone Creek at Summit of Meetinghouse Canyon |

(Excerpt from Monthly Progress Report, February 1971 - "A Study and Review of Vegetation, Ecological Conditions, and Air Quality at the Huntington Canyon Powerplant Location," Utah Power & Light Company, Prepared by Utah Engineering Experiment Station - Center for Environmental Studies - University of Utah)

## METHODS AND SAMPLING CONDITIONS

On February 1, 1971, the filter sampler at the Harrison Station was moved to the Shirl MacArthur residence, one door east of the LDS chapel on Second North Street in Huntington. This will give us three stations in Huntington.

Chemical analysis for $SO_2$ and $NO + NO_2$, using the methods described in the October report, were made December 14-17, 1970. These dates were chosen because a high pressure and stable air situation associated with inversion conditions had existed for a few days.

Dust fall jar, glass fiber filter, ozone, nephelometer, Beckman 906 $SO_2$, and Andersen sampler data for November, December, January, and February were processed.

The mobile lab was operated at various sites in Huntington on December 2, 3, 4, and 15, 1970. An attempt was made to maneuver downwind from local sources of pollution (churches, schools, and homes). The trailer unit was operated at the Litster residence for the remainder of the time.

## RESULTS AND DISCUSSION

### Sulfur Dioxide

Levels of $SO_2$ in Huntington were very low. Levels measured downwind from schools and churches gave only trace amounts except for some short-term peaks up to 2.5 pphm, as shown in Table 1. Routine operation of the Beckman 906 $SO_2$ analyzer at the Litster station gave zero readings or occasionally trace amounts (0.5 pphm) for all times measured except the days and peak concentrations presented in Table 2. Table 3 presents chemical analysis data. The peak levels measured are usually of short duration. The maximum measured in the winter was 8.0 pphm on December 14, but a 9-hour average for the period was 0.72 pphm (see Tables 2 and 3). The most stringent Federal standard (secondary) proposed by the Environmental Protection Agency (EPA) would allow a 24-hour average of 9 pphm. The peaks measured this past winter in Huntington were below this level. The 2 pphm standard for the annual average (arithmetic mean) is also well above the average $SO_2$ concentrations measured in Huntington.

## Oxides of Nitrogen

A chemical analysis of the oxides of nitrogen (NO and $NO_2$) is presented in Table 3. The average level of $SO_2$ for the corresponding period is also shown. The ratio of NO + $NO_2$ to $SO_2$ was 2.0. Using the peak value of $SO_2$ concentration of 8 pphm, the highest expected NO + $NO_2$ value would be 16 pphm which is well below the 50 pphm required to cause damage to sensitive plants when exposed for several hours. The Federal standard proposed for a 24-hour average is 12.5 pphm. The maximum daily average expected for the oxides of nitrogen would be less than 1.5 pphm measured as a 9-hour average (Table 3) when the $SO_2$ was maximal.

## Particulates

Suspended particulate matter concentrations in $\mu g/m^3$ are presented in Tables 4 through 13. Tables 4 and 5 summarize the data. Comparison of the stations shows that, with one exception, the Rowley station in Huntington had the highest average for a particular month, and the highest overall average. The Litster station was slightly higher in January, similar for December, and somewhat lower in February. The Litster station is near the church and schools and is in an area of greater activity. One of the roads adjacent to the Rowley home is unsurfaced. The high monthly averages for January at these two stations were associated with consistently high daily levels. Since winds were moderate, the levels were probably due to increased home heating. In February, the first two weeks were very windy, and on February 10, a very strong wind resulted in peaks of 416.5, 261.8, and 279.9 $\mu g/m^3$ for the Rowley, Litster, and MacArthur stations, respectively. The Litster and MacArthur stations were about the same for February.

The Utah State Division of Health code for particulates states: "In the State of Utah, the concentration of total suspended particulate matter in ambient air shall not exceed an annual geometric mean of 90 micrograms per cubic meter of air, with the further limitation that not more than 1% of the samples collected between April 1, and October 31, nor more than 5% of the samples collected between November 1, and March 31, shall exceed a concentration of 200 micrograms per cubic meter of air." Our data are presented as an arithmetic mean or average. Generally, the geometric mean, calculated by the State Division of Health by use of a computer, is 15% less than the arithmetic mean. Since the average particulate concentrations measured in Huntington would be expected to range from about 59 to 65 $\mu g/m^3$ (geometric mean), the values are less than the state standard. Daily concentration of 200 $\mu g/m^3$ set by the State has been exceeded to the extent shown in Table 5. The State limit was exceeded at the Harrison Station on 2.6 and 0% of the days for August-October and November-January, respectively. This station, however, met the State standard for the remainder of the sampling period and on the average was one of the lowest. This points out the contribution of local activity on the days this concentration was exceeded.

The most stringent proposed Federal Standard is 60 $\mu g/m^3$ for an annual geometric mean, and a limit of one day in excess of 150 $\mu g/m^3$. The Bear Creek station met these standards so far, and the Litster station is marginal.

Visibility data, as measured by the nephelometer for the Litster station near the school, are presented in Tables 14 and 15. Diurnal curves for January and February are shown in Figure 1. Improved visibility during the daytime may be associated with less home heating, decreased humidity, and a decrease in inversions. The low visibility at eight and nine o'clock in the morning may be associated with morning heating.

The size range distribution of particulates on a basis of weight and percentage are presented in Tables 16-19. Percentages of large particles (greater than 5 microns) were 41.7 for the Harrison station in November and 66.5 and 62.0 at the Litster station in December and February, respectively. The greatest proportion measured in the size fraction less than 1 micron was 28.5% at the Litster station in February.

Dust fall data are presented in Tables 20 and 21. Dust fall in Huntington and Castle Dale was generally higher than in the canyon areas except for the Bear Creek station which would be influenced by dust from the coal trucks traveling on the road several hundred feet below.

Ozone ($O_3$)

Results of Mast ozone monitoring are presented in Tables 22-24. Diurnal curves are presented in Figures 2 and 3. A high peak (10.1 pphm) lasting 3 to 4 hours was measured at the Litster station in Huntington on November 14 and 15. This appeared to be a local situation since no other reading above 4.2 pphm was noted at the Harrison station during November. The Federal standard is set at 6 pphm for an hour average. The September and October diurnal curves are more flattened out over the course of the day. The winter-time peaks are about the same as earlier in the Fall, but the daily average is generally lower.

TABLE 1

MOBILE SAMPLING IN HUNTINGTON

(1970)

$SO_2$ Measurements with 906 Analyzer Downwind from Schools and Churches

| Date | Time | Location | Concentration (pphm) Peak | Average |
|---|---|---|---|---|
| 12-2 | 930-1100 | 300 ft. SW of School | 0 | 0 |
| | 1130-1300 | 300 ft. N of School | 0 | 0 |
| 12-3 | 1045-1230 | 600 ft. NW of LDS Church | 2.5 | 0.5 |
| | 1300-1430 | 600 ft. N of LDS Church | trace | $<$0.5 |
| 12-4 | 915-1100 | 1st N and 1st E | 1.0 | 0.8 |
| 12-15 | 1000-1300 | 600 ft. N of LDS Church | trace | $<$0.5 |

TABLE 2

SULFUR DIOXIDE MEASURED AT LITSTER STATION WITH THE 906 ANALYZER

(Peaks and Daily Averages for Days that Significant Concentrations were Measured)

| Date | Time | Peak Concentration (pphm) | Daily Average (pphm) |
|---|---|---|---|
| 12-14-70 | 2300-2330 | 8.0 | --- |
| 12-15-70 | 0030-0130 | 5.0 | .06 |
| 1-25-71 | 1800-1900 | 1.5 | .8 |
| 1-26-71 | 1400-1415 | 2.5 | 1.0 |
| 1-27-71 | 0100-0230 | 1.5 | .06 |
| The other 88 days | | 0 | 0 |

TABLE 3

CONCENTRATIONS OF SULFUR DIOXIDE AND THE OXIDES OF NITROGEN DETERMINED BY WEST AND GAEKE $SO_2$ ANALYSIS AND SALTZMAN $NO_x$ ANALYSIS (HUNTINGTON)

(1970)

| December Date | Time | Station | Pollutant Concentration (pphm) $SO_2$ | Pollutant Concentration (pphm) $NO + NO_2$ |
|---|---|---|---|---|
| 14 to 15 | 2235-0735 | Litster | 0.72 | 1.47 |
| 16 to 17 | 1600-0845 | Rowley | 0.05 | - |

TABLE 4

SUMMARY OF MONTHLY AVERAGE PARTICULATE CONCENTRATIONS ($\mu g/m^3$)

| Month | Harrison | Rowley | Litster | MacArthur | Bear Creek |
|---|---|---|---|---|---|
| Aug. | 24.9 | 76.5 | - | - | 11.9 |
| Sept. | 71.5 | 92.8 | - | - | 16.6 |
| Oct. | 17.3 | 75.7 | - | - | 9.0 |
| Nov. | 25.2 | 75.2 | - | - | 10.6 |
| Dec. | 25.1 | 51.9 | 46.4 | - | - |
| Jan. | 24.2 | 98.0 | 103.0 | - | - |
| Feb. | - | 93.1 | 74.7 | 73.8 | - |

TABLE 5

SUMMARY OF PARTICULATE CONCENTRATIONS

| Covered | Station | Number of Daily Samples | Arithmetic Mean ($\mu g/m^3$) | Days in Excess of 150 $\mu g/m^3$ | Days in Excess of 200 $\mu g/m^3$ |
|---|---|---|---|---|---|
| Aug. - Nov. | Bear Creek | 94 | 11.8 | 0 | 0 |
| Aug. - Jan. | Harrison | 153 | 30.9 | 4 | 2 |
| Aug. - Feb. | Rowley | 186 | 76.1 | 5 | 2 |
| Dec. - Feb. | Litster | 74 | 69.3 | 1 | 1 |
| Feb. | MacArthur | 27 | 73.8 | 1 | 1 |

TABLE 14

VISIBILITY IN MILES FROM NEPHELOMETER DATA
LITSTER STATION - HUNTINGTON

(1970)

Daily Averages, Minimum Hour Average and Minimum Visibility

| | NOVEMBER | | | DECEMBER | | |
|---|---|---|---|---|---|---|
| Day | Daily Average | Minimum Hour | Minimum | Daily Average | Minimum Hour | Minimum |
| 1 | | | | 83 | 76 | 15 |
| 2 | | | | 80 | 76 | 25 |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| 13 | 89 | 75 | 17 | | | |
| 14 | 88 | 81 | 81 | 82 | 66 | |
| 15 | 97 | 69 | 16 | 78 | 59 | 21 |
| 16 | 85 | 72 | 1 | 92 | 59 | 13 |
| 17 | 78 | 69 | 1 | | | |
| 18 | 82 | 69 | 1 | | | |
| 19 | 84 | 69 | 25 | | | |
| 20 | 82 | 72 | 25 | | | |
| 21 | 82 | 69 | 1 | | | |
| 22 | 81 | 62 | 25 | | | |
| 23 | 83 | 62 | 23 | 96 | 74 | 14 |
| 24 | 80 | 72 | 16 | 75 | 59 | 25 |
| 25 | 78 | 62 | 42 | 77 | 59 | 16 |
| 26 | 82 | 76 | 42 | 86 | 59 | 16 |
| 27 | 80 | 69 | 33 | 82 | 33 | 29 |
| 28 | 78 | 62 | 16 | 81 | 59 | 23 |
| 29 | 72 | 66 | 33 | 81 | 49 | 16 |
| 30 | 82 | 76 | 33 | 90 | 59 | 25 |
| 31 | | | | 84 | 59 | 16 |

TABLE 15

VISIBILITY IN MILES FROM NEPHELOMETER DATA
LITSTER STATION - HUNTINGTON

(1971)

Daily Averages, Minimum Hour Average and Minimum Visibility

| | JANUARY | | | FEBRUARY | | |
|---|---|---|---|---|---|---|
| Day | Daily Average | Minimum Hour | Minimum | Daily Average | Minimum Hour | Minimum |
| 1 | | | | 67.2 | 25 | 1 |
| 2 | | | | 80.0 | 44 | 16 |
| 3 | | | | 91.2 | 52 | 21 |
| 4 | | | | 66.6 | 34 | 0.3 |
| 5 | | | | 89.8 | 52 | 0.8 |
| 6 | | | | 93.2 | 67 | 27 |
| 7 | | | | 86.4 | 30 | 1 |
| 8 | | | | 79.8 | 42 | 1 |
| 9 | | | | 73.2 | 49 | 1 |
| 10 | | | | 72.8 | 37 | 1 |
| 11 | | | | 74.2 | 42 | 7 |
| 12 | | | | 75.8 | 30 | |
| 13 | | | | 73.0 | 30 | 1 |
| 14 | | | | 65.6 | 30 | 1 |
| 15 | 33.6 | 21 | 1 | 63.4 | 20 | 1 |
| 16 | 44.2 | 16 | 1 | 71.6 | 30 | 0.5 |
| 17 | 51.8 | 17 | 1 | 65.0 | 49 | 23 |
| 18 | 54.2 | 18 | 1 | 70.4 | 33 | 1 |
| 19 | 65.4 | 33 | 1 | 65.0 | 37 | 1 |
| 20 | 46.8 | 25 | 1 | 86.0 | 42 | 27 |
| 21 | 67.6 | 33 | 1 | 59.4 | 30 | 7 |
| 22 | 93.4 | 49 | 1 | 63.2 | 30 | 1 |
| 23 | 64.0 | 27 | 1 | 58.8 | 30 | 12 |
| 24 | 74.2 | 30 | 1 | 51.2 | 20 | 1 |
| 25 | 69.2 | 23 | 0.7 | 74.6 | 30 | 1 |
| 26 | 63.2 | 34 | 1 | 76.0 | 30 | 16 |
| 27 | 56.8 | 18 | 0.8 | | | |
| 28 | 64.6 | 34 | 1 | | | |
| 29 | 52.6 | 17 | 0.7 | | | |
| 30 | 67.2 | 34 | 1 | | | |
| 31 | 75.4 | 44 | 0.6 | | | |

TABLE 16

HARRISON STATION - ANDERSEN SAMPLER

(1970)

Percentage by Weight of Total Particulates In Different Particle Size Ranges

| Date | Size Distribution (μ) | | | | | |
|---|---|---|---|---|---|---|
| | 8.4-15+ | 5-10.4 | 3-6.1 | 1.8-3.5 | 1-2.2 | 1.2-0.6 |
| 11-1 to 11-8 | 26.6 | 19.2 | 16.0 | 14.0 | 12.7 | 11.5 |
| 11-8 to 11-16 | 25.0 | 20.5 | 17.1 | 11.7 | 11.7 | 14.0 |
| 11-16 to 11-23 | 6.8 | 20.5 | 21.0 | 10.7 | 18.0 | 23.0 |
| 11-23 to 11-30 | 28.6 | 14.5 | 22.6 | 14.1 | 15.2 | 5.0 |
| Average | 23.2 | 18.5 | 18.7 | 12.9 | 14.1 | 12.5 |

TABLE 17

LITSTER STATION - ANDERSEN SAMPLER

Weight of Particulates in Different Particle Size Ranges ($\mu g/m^3$)

| Date | Size Distribution (μ) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 8.4-15+ | 5-10.4 | 3-6.1 | 1.8-3.5 | 1.2-2.2 | 1.2-0.6 | <1.0 |
| Dec. 1970 23 to 30 | 7.81 | 1.72 | 1.72 | 0.94 | 1.80 | 4.30 | 12.73 |
| Jan. 1971 23 to 30 | -* | 30.1* | 9.2 | 6.8 | 5.1 | 2.4 | 16.9 |
| Feb. 1971 1 to 8 | 26.9 | 5.0 | 1.3 | 2.1 | 0.1 | 2.8 | 9.4 |
| 8 to 15 | 38.2 | 6.2 | 4.0 | 3.5 | 1.9 | 0.5 | 13.2 |
| 16 to 23 | 18.5 | 5.6 | 1.1 | 0.5 | 1.2 | 0.1 | 21.1 |
| Feb. Average | 27.9 | 5.9 | 2.1 | 2.0 | 1.1 | 1.1 | 14.4 |

* No filter on first stage. All the particles above 5 microns were collected on the second stage resulting in its having a high reading.

TABLE 18

LITSTER STATION - ANDERSEN SAMPLER

(1970)

Percentage by Weight of Total Particulates In Different Particle Size Ranges

| Date | Size Distribution (μ) | | | | | |
|---|---|---|---|---|---|---|
| | 8.4-15+ | 5-10.4 | 3-6.1 | 1.8-3.5 | 1-2.2 | 1.2-0.6 |
| 12-2 to 12-9 | 64.7 | 11.4 | 7.8 | 8.1 | 7.2 | 0.7 |
| 12-9 to 12-16 | 43.5 | 15.3 | 13.4 | 11.0 | 9.4 | 7.4 |
| 12-16 to 12-23 | 43.5 | 19.0 | 13.7 | 12.2 | 0 | 11.4 |
| 12-23 to 12-30 | 25.2 | 5.5 | 5.5 | 3.0 | 5.8 | 13.9 |
| Average | 51.7 | 14.8 | 11.3 | 10.2 | 6.1 | 5.9 |

TABLE 19

LITSTER STATION - ANDERSEN SAMPLER

(1971)

Percentage by Weight of Total Particulates
in Different Size Ranges

| Date | Size Distribution (μ) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 8.4-15+ | 5-10.4 | 3-6.1 | 1.8-3.5 | 1-2.2 | 1.2-0.6 | <1.0 |
| 1-16 to 1-23 | 60.3 | 19.3 | 2.9 | 6.8 | 8.2 | 2.5 | - |
| 1-23 to 1-30 | - | 43.4 | 12.9 | 9.6 | 7.1 | 3.3 | 23.7 |
| 2-1 to 2-8 | 56.7 | 10.5 | 2.8 | 4.4 | 0.2 | 5.8 | 19.9 |
| 2-8 to 2-15 | 53.5 | 8.8 | 5.5 | 5.1 | 2.7 | 0.7 | 18.5 |
| 2-16 to 2-23 | 38.6 | 11.6 | 2.2 | 1.0 | 2.4 | 0.2 | 43.9 |
| Feb. Average | 51.2 | 10.8 | 3.9 | 3.7 | 2.0 | 2.0 | 26.5 |

TABLE 22

Ozone ($O_3$) Concentrations (pphm)*

HARRISON LOCATION

Daily Averages and High Hour Readings

| | NOVEMBER | |
|---|---|---|
| Day | Daily Average | High Hour |
| 1 | 2.7 | 3.6 |
| 2 | 3.0 | 3.5 |
| 3 | 3.2 | 3.9 |
| 4 | 3.1 | 4.0 |
| 5 | 2.5 | 3.5 |
| 6 | 2.3 | 3.5 |
| 7 | 2.7 | 3.6 |
| 8 | 3.4 | 3.6 |
| 9 | 2.7 | 3.3 |
| 10 | 2.1 | 3.3 |
| 11 | 2.5 | 3.1 |
| 12 | 2.6 | 3.3 |
| 13 | 3.3 | 3.5 |
| 14 | 3.2 | 3.5 |
| 15 | 2.9 | 3.5 |
| 16 | 2.4 | 3.0 |
| 17 | 2.2 | 3.5 |
| 18 | 2.3 | 3.3 |
| 19 | 2.2 | 3.6 |
| 20 | 2.7 | 3.5 |
| 21 | 2.1 | 3.4 |
| 22 | 2.2 | 3.1 |
| 23 | 2.0 | 3.0 |
| 24 | 1.6 | 2.7 |
| 25 | 2.0 | 3.6 |
| 26 | 2.5 | 3.1 |
| 27 | 2.5 | 3.3 |
| 28 | 2.0 | 3.0 |
| 29 | 1.8 | 2.5 |
| 30 | 3.0 | 4.2 |
| 31 | | |

* Concentrations corrected for mast efficiency and to sea level pressure.

TABLE 23

Ozone ($O_3$) Concentrations (pphm)*

LITSTER STATION - HUNTINGTON

(1970)

Daily Averages and High Hour Readings

| Day | NOVEMBER | | DECEMBER | |
|---|---|---|---|---|
| | Daily Average | High Hour | Daily Average | High Hour |
| 1 | | | 2.3 | 3.1 |
| 2 | | | | |
| 3 | | | 2.5 | 3.9 |
| 4 | | | | |
| 5 | | | 3.4 | 4.4 |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | 3.3 | 3.7 | | |
| 14 | 4.0 | 10.1 | 1.5 | 1.7 |
| 15 | 4.0 | 8.8 | 2.6 | 3.9 |
| 16 | 3.4 | 4.7 | 2.6 | 3.5 |
| 17 | 2.4 | 3.9 | | |
| 18 | 2.4 | 4.2 | | |
| 19 | 3.0 | 4.1 | | |
| 20 | 1.6 | 3.1 | | |
| 21 | 2.3 | 3.3 | | |
| 22 | 2.4 | 3.3 | | |
| 23 | 2.4 | 3.0 | 3.2 | 3.9 |
| 24 | 1.9 | 3.1 | 2.2 | 3.6 |
| 25 | 2.0 | 3.0 | 2.2 | 3.1 |
| 26 | 2.4 | 3.1 | 1.9 | 3.1 |
| 27 | 2.3 | 3.3 | 2.0 | 3.3 |
| 28 | 2.1 | 2.8 | 2.1 | 3.3 |
| 29 | 1.7 | 2.5 | 2.1 | 3.1 |
| 30 | 2.9 | 4.4 | 2.3 | 3.6 |
| 31 | | | 2.0 | 3.3 |

* Concentrations corrected for mast efficiency and to sea level pressure.

TABLE 24

Ozone ($O_3$) Concentration (pphm)*

LITSTER STATION - HUNTINGTON

(1971)

Daily Averages and High Hour Readings

| Day | JANUARY | | FEBRUARY | |
|---|---|---|---|---|
| | Daily Average | High Hour | Daily Average | High Hour |
| 1 | | | 0.8 | 2.0 |
| 2 | | | 1.1 | 2.0 |
| 3 | | | 2.8 | 3.3 |
| 4 | | | 3.1 | 4.2 |
| 5 | | | 3.6 | 4.1 |
| 6 | | | 3.4 | 4.1 |
| 7 | | | 2.7 | 3.9 |
| 8 | | | 2.6 | 4.2 |
| 9 | | | 2.0 | 2.7 |
| 10 | | | 2.0 | 3.6 |
| 11 | | | 3.3 | 4.2 |
| 12 | | | 2.2 | 3.7 |
| 13 | | | 1.6 | 2.7 |
| 14 | | | 1.6 | 3.1 |
| 15 | | | 1.9 | 3.3 |
| 16 | | | 2.3 | 3.9 |
| 17 | | | 2.3 | 3.1 |
| 18 | | | 2.7 | 3.7 |
| 19 | 1.4 | 2.5 | 3.1 | 3.9 |
| 20 | 1.3 | 2.7 | 4.1 | 4.7 |
| 21 | 1.7 | 2.8 | 3.2 | 4.7 |
| 22 | 2.3 | 3.0 | 3.3 | 3.9 |
| 23 | 1.6 | 3.1 | 2.7 | 4.1 |
| 24 | 1.5 | 2.5 | 2.8 | 4.7 |
| 25 | 1.7 | 2.8 | 3.3 | 4.7 |
| 26 | 1.4 | 2.6 | 3.9 | 4.2 |
| 27 | 1.2 | 2.3 | | |
| 28 | 1.5 | 2.8 | | |
| 29 | 1.3 | 3.0 | | |
| 30 | 1.4 | 2.5 | | |
| 31 | 1.3 | 2.0 | | |

* Concentrations corrected for mast efficiency and to sea level pressure.

# THE EFFECT OF A COAL-BURNING POWERPLANT AND ASSOCIATED RESERVOIR ON THE AQUATIC ECOSYSTEM

Robert N. Winget, Brigham Young University, Center for Environmental Studies, Provo, Utah 84601

The objectives of this study are to determine effects on the aquatic ecosystem caused by emissions and effluent from a coal-burning powerplant, and an associated 30,000 acre-foot reservoir to be constructed in Central Utah.

APPROACH: During the first year of the study, components of the flora and fauna and chemical and physical parameters will be determined at 14 stations on various streams, reservoirs, and lakes peripheral to the proposed plant. Detailed analyses will be made of the ecosystem of Huntington Creek upon which the proposed reservoir and powerplant will be built.

Physical and chemical parameters to be determined include: (1) total suspended solids, including fly ash; (2) dissolved nitrates, nitrites, sulfur compounds, phosphates, carbonates, silicon compounds, fluorides, selected metal ions, oxygen, and $CO_2$; (3) pH, alkalinity, turbidity and temperature. Concentrations of fly ash and potential pollutants in accumulated snowcover will also be determined.

This study is anticipated to be continued for four years prior to the operation of the plant, and at annual or biennial intervals for as long as ten years after the plant begins operation.

SUPPORTED BY: Utah Power & Light Company and Brigham Young University.

## HUNTINGTON PLANT FUEL

1-13-71
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The average fuel characteristics are expected to be as follows:

| Bituminous Coal | Hiawatha Seam | Blind Canyon Seam |
|---|---|---|
| Grindability, Hardgrove | 46 | 46 |
| Proximate Analysis: (As Received) | | |
| Size, Inches Max. | 1-5/8X0 | 1-5/8X0 |
| Moisture, % | 6.43 | 6.04 |
| Volatile Matter, % | 40.67 | 42.00 |
| Fixed Carbon, % | 42.88 | 44.88 |
| Ash, % | 9.43 | 6.62 |
| Sulfur, % | .59 | .46 |
| Total, % | 100.00 | 100.00 |
| B.t.u./lb. | 12,192 | 12,944 |
| Ash Fusion Temperatures (Reducing): | | |
| Initial Deformation, °F | 2,250 | 1,950 |
| Soft, °F | 2,310 | 1,990 |
| Fluid, °F | 2,460 | 2,050 |
| Ultimate Analysis: | | |
| Moisture, % | 6.43 | 6.04 |
| Carbon, % | 68.30 | 70.61 |
| Hydrogen, % | 4.91 | 5.40 |
| Nitrogen, % | .81 | 1.23 |
| Oxygen, % | 10.18 | 10.07 |
| Sulfur, % | .55 | .43 |
| Ash, % | 8.82 | 6.22 |
| Total | 100.00 | 100.00 |
| Chemical Analysis of Ash: | | |
| $P_2O_5$ | .88 | .32 |
| $SiO_2$ | 51.62 | 53.53 |
| $Fe_2O_3$ | 4.73 | 5.39 |
| $Al_2O_3$ | 22.30 | 19.43 |
| $TiO_2$ | 1.24 | 1.11 |
| CaO | 7.80 | 8.25 |
| MgO | .67 | .87 |
| $SO_3$ | 5.21 | 5.25 |
| $K_2O$ | .34 | .46 |
| $Na_2O$ | 4.46 | 4.80 |
| Und. | .75 | .59 |

Right Fork of Huntington Canyon

The 30,000 acre-foot reservoir will provide fishing and boating and will be an excellent addition to the recreational resources of the area.

The stream flows below the dam will be less subject to fluctuation than at present. The attached inflow and outflow diagrams outline intended operation releases during a typical (1) wet year, (2) average year, and (3) dry year. Release from Electric Lake will depend upon the type of water year experienced.

1. Wet Year - The February 1st snow survey will indicate a high spring runoff. Storage release can begin and be increased during March and April if the progressive snow surveys indicate a sufficiently high runoff as in 1952. The reservoir will probably not be drawn down more than 30 feet (10,000 acre-feet) for this type of flood control. The reservoir is not large enough to fully control the excessive runoff during a wet year, and outflow may exceed 200 cfs during May and June. For the remainder of the year, the outflow will be 10 cfs or more.

   The relatively small 30 square-mile drainage area is somewhat unique with this reservoir. Studies have indicated that a flash flood is probably the most serious flood condition, and the dam and spillway will be designed to accommodate severe flash flooding, reducing downstream flows to a factor of 1/8. Thus, flash floods that would have been disastrous to fish will very likely be eliminated.

2. Average Year - Storage release will begin sometime in January. The Company estimates the flow below the reservoir will remain 10 cfs or above until September or October and as low as eight cfs in November and December. Storage requirements during the spring should hold the maximum runoff release to about 90 cfs.

3. Dry Year - Downstream requirements for Electric Lake storage water should keep the outflow from the reservoir in excess of 10 cfs, except possibly during July and August. During eight months of the year, outflows would be substantially above inflows (giving a substantial benefit to fisheries). The Company would not reduce the outflow below six cfs unless inflow was below that figure.

   The operation outlined above is probable only under full development of the water supply. When the plant requirements are smaller, water releases should be above that indicated on the charts, except possibly in a dry year.

The project will add to the fishery potential because of added regulation, reducing very high runoffs and flood hazard, and increasing minimum flows--particularly in dry years.

Left Fork of Huntington Canyon

Water-storage rights purchased by the Company in the small Left Fork reservoirs could generally be utilized for fishing purposes. Twenty-three (23) per cent of the storage in the Left Fork Reservoirs has been acquired for the Huntington Canyon Plant and will be fully used for power purposes during drought years; however, it is likely that during the wet and average years, a portion of the water acquired might be held over in the reservoirs in anticipation of a drought year.

The power development will significantly improve the fishing potential of these small reservoirs and improve the downstream fishing in the Left Fork, since it will bring about a more gradual release of water throughout the year than is now the case under the present irrigation operation.

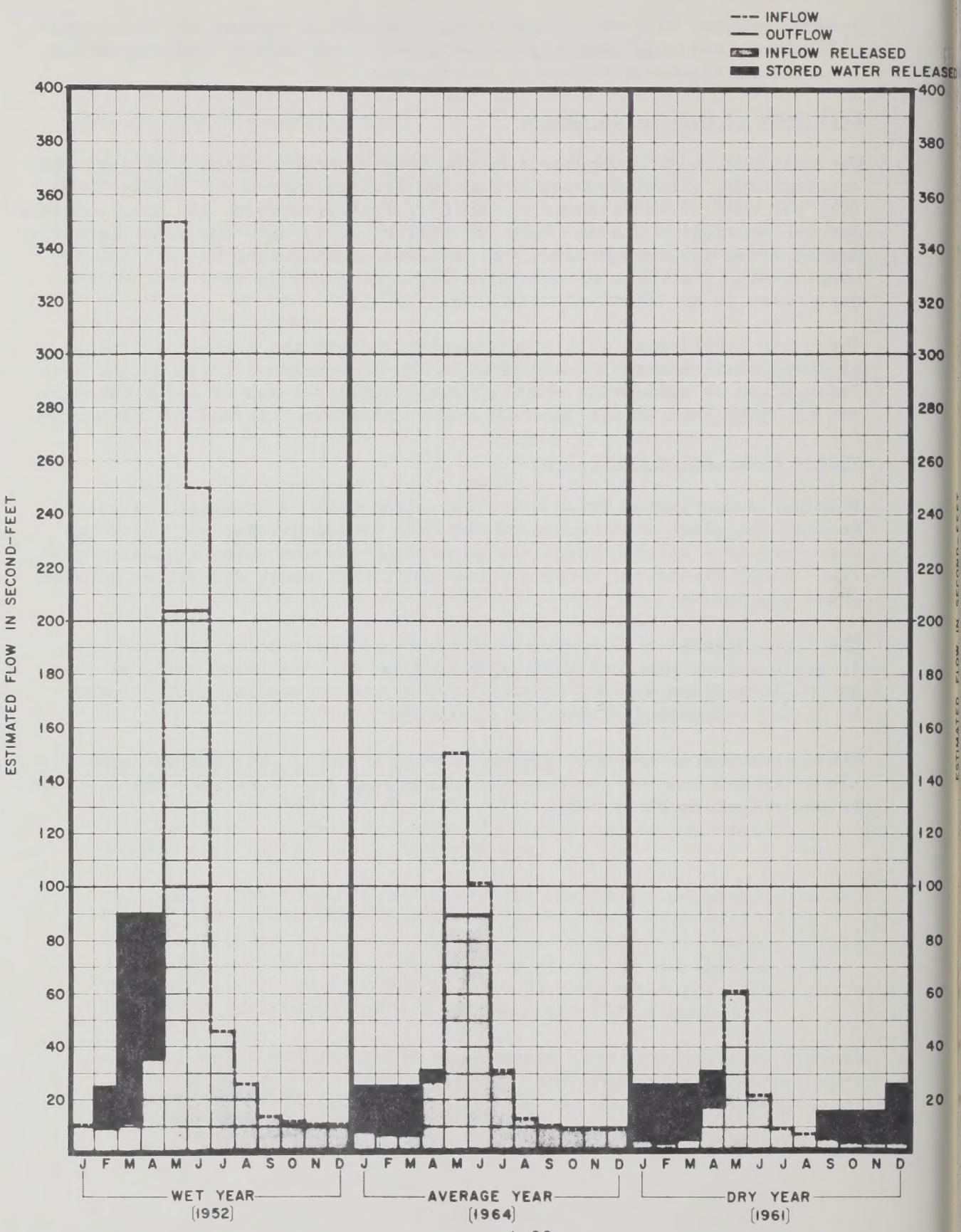
Stream Flows Below Powerplant

Fishing in Huntington Creek below the plant will be adversely affected because the plant will be one of the main stream diversions. Although there are four miles between the powerplant and the main Cleveland "Highline" Canal Diversion, there are two additional small diversions between these two points.

The first diversion is approximately one-half mile below the plantsite. It would appear that any fish in the stream at this point could be lost in the irrigation system, and that the stream is probably not stocked or fished extensively below the plantsite.

Flows recorded at the USGS gaging station a little over a mile below the plantsite get down to two cfs, and the stream is, in effect, dry at times below irrigation diversions.

# ELECTRIC LAKE MAXIMUM OPERATION DURING A WET, AVERAGE & DRY YEAR



UTAH STATE DIVISION OF HEALTH

CODE ESTABLISHING A
*TOTAL SUSPENDED PARTICULATE STANDARD FOR AMBIENT AIR

In the State of Utah the concentration of total suspended particulate matter in ambient air shall not exceed an annual geometric mean of 90 micrograms per cubic meter of air, with the further limitation that not more than 1% of the samples collected between April 1 and October 31 nor more than 5% of the samples collected between November 1 and March 31 shall exceed a concentration of 200 micrograms per cubic meter of air.

All sampling procedures used to obtain data in relation to this standard must be acceptable to the Executive Secretary and shall conform, as nearly as possible, to the following criteria:

a. Sampling stations shall be placed 15 to 50 feet above ground level and shall be located in areas of population concentration but not in areas zoned for heavy industry.

b. Samples shall be collected on a regular schedule of not less than every other day using a high-volume sampler equipped with an 8" x 10" MSA glass fiber filter. Samples of air shall be drawn through the filter continuously for periods of not less than 20 hours nor more than 28 hours and at a flow rate of not less than 20 cubic feet per minute. The sampling procedures enumerated may be used directly or employed as reference for calibration of other methods.

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* "Total Suspended Particulate" means any dispersed matter, collected by the above procedure, the individual aggregates of which are within the range of less than 50 microns in diameter but larger than single molecules.

UTAH STATE DIVISION OF HEALTH

Proposed

# CODE OF AIR QUALITY REGULATIONS RELATING TO SULFUR DIOXIDE

In the State of Utah the concentration of sulfur dioxide* in ambient air at any given point shall not exceed either 0.02 parts per million (p.p.m.) by volume, calculated as an annual average, or 0.1 p.p.m. by volume, calculated as a daily average**, subject to the further restrictions that the

(a) concentrations shall never exceed 1.0 p.p.m., and may equal 1.0 p.p.m. for not more than 2 half-hour intervals in any day and not more than 20 half-hour intervals in any month;

(b) concentration may equal 0.5 p.p.m. for not more than 5 half-hour intervals in any day and not more than 60 half-hour intervals in any month.

The table below summarizes this standard for sulfur dioxide concentrations for the identified basic control periods, subject at all times to the annual and daily averages stated above.

| Limits of $SO_2$* Concentration p.p.m. (volume) | Basic Control Periods | | |
|---|---|---|---|
| | Period | Total Periods in any Day | Total Periods in any Month |
| 0.02 | one year | Not applicable | Not applicable |
| 0.10 | 24 hours | Not applicable | ** |
| 0.50 | ½ hour | 5 | 60 |
| 1.00 | ½ hour | 2 | 20 |

Note 1: Year, month and day mean the calendar period

Note 2: Multiply p.p.m. by 2860 to convert to $\mu g/m^3$

* Includes both $SO_2$ and $SO_3$, as measured by a conductometric process as used in the Thomas Autometer, or an equivalent method approved by the Executive Secretary.

** Medical evidence, not fully substantiated, may indicate the desirability of including a limit on the number of consecutive days during which a daily average of 0.10 will be acceptable. A limit will be established as a specific requirement when valid data become available.

PART 410

EXCERPTS FROM NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS

§ 410.1 Definitions.

(a) As used in this part, all terms not defined herein shall have the meaning given them by the Act.

(b) "Act" means the Clean Air Act, as amended (Public Law 91-604; 84 Stat. 1676).

(c) "Agency" means the Environmental Protection Agency.

(d) "Administrator" means the Administrator of the Environmental Protection Agency.

(e) "Ambient air" means that portion of the atmosphere, external to buildings, to which the general public has access.

"Reference method" means a method of sampling and analyzing for an air pollutant, as described in an appendix to this part.

(g) "Equivalent method" means any method of sampling and analyzing for an air pollutant which can be demonstrated to the Administrator's satisfaction to have a consistent relationship to the reference method.

§ 410.2 Scope.

(a) National primary and secondary ambient air quality standards under section 109 of the Act are set forth in this part.

(b) National primary ambient air quality standards define levels of air quality which the Administrator judges are necessary, with an adequate margin of safety, to protect the public health. National secondary ambient air quality standards define levels of air quality which the Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Such standards are subject to revision, and additional primary and secondary standards may be promulgated as the Administrator deems necessary to protect the public health and welfare.

(c) The promulgation of national primary and secondary ambient air quality standards shall not be considered in any manner to allow significant deterioration of existing air quality in any portion of any State.

(d) The proposal, promulgation, or revision of national primary and secondary ambient air quality standards shall not prohibit any State from

establishing ambient air quality standards for that State or any portion thereof which are more stringent than the national standards.

§ 410.3 Reference conditions.

All measurements of air quality are corrected to a reference temperature of 25° C. and to a reference pressure of 760 millimeters of mercury (1.013.2 millibars).

§ 410.4 National primary ambient air quality standards for sulfur oxides (sulfur dioxide).

The national primary ambient air quality standards for sulfur oxides, measured as sulfur dioxide by the reference method described in Appendix A to this part, or by an equivalent method, are:

(a) 80 micrograms per cubic meter (0.03 p.p.m.)--annual arithmetic mean.

(b) 365 micrograms per cubic meter (0.14 p.p.m.)--maximum 24-hour concentration not to be exceeded more than once per year.

§ 410.5 National secondary ambient air quality standards for sulfur oxides (sulfur dioxide).

The national secondary ambient air quality standards for sulfur oxides, measured as sulfur dioxide by the reference method described in Appendix A to this part, or by an equivalent method, are:

(a) 60 micrograms per cubic meter (0.02 p.p.m.)--annual arithmetic mean.

(b) 260 micrograms per cubic meter (0.1 p.p.m.)--maximum 24-hour concentration not to be exceeded more than once per year, as a guide to be used in assessing implementation plans to achieve the annual standard.

(c) 1,300 micrograms per cubic meter (0.5 p.p.m.)--maximum 3-hour concentration not to be exceeded more than once per year.

§ 410.6 National primary ambient air quality standards for particulate matter.

The national primary ambient air quality standards for particulate matter, measured by the reference method described in Appendix B to this part, or by an equivalent method, are:

(a) 75 micrograms per cubic meter--annual geometric mean.

(b) 260 micrograms per cubic meter--maximum 24-hour concentration not to be exceeded more than once per year.

§ 410.7 National secondary ambient air quality standards for particulate matter.

The national secondary ambient air quality standards for particulate matter, measured by the reference method described in Appendix B to this part, or by an equivalent method, are:

(a) 60 micrograms per cubic meter--annual geometric mean, as a guide to be used in assessing implementation plans to achieve the 24-hour standard.

(b) 150 micrograms per cubic meter--maximum 24-hour concentration not to be exceeded more than once per year.

§ 410.8 National primary and secondary ambient air quality standards for carbon monoxide.

The national primary and secondary ambient air quality standards for carbon monoxide, measured by the reference method described in Appendix C to this part, or by an equivalent method, are:

(a) 10 milligrams per cubic meter (9 p.p.m.)--maximum 8-hour concentration not to be exceeded more than once per year.

(b) 40 milligrams per cubic meter (35 p.p.m.)--maximum 1-hour concentration not to be exceeded more than once per year.

§ 410.9 National primary and secondary ambient air quality standards for photochemical oxidants.

The national primary and secondary ambient air quality standard for photochemical oxidants, measured and corrected for interferences due to nitrogen oxides and sulfur dioxide by the reference method described in Appendix D to this part, or by an equivalent method, is: 160 micrograms per cubic meter (0.08 p.p.m.)--maximum 1-hour concentration not to be exceeded more than once per year.

§ 410.10 National primary and secondary ambient air quality standard for hydrocarbons.

The hydrocarbons standard is for use as a guide in devising implementation plans to achieve oxidant standards.

The national primary and secondary ambient air quality standard for hydrocarbons, measured and corrected for methane by the reference method described in Appendix E to this part, or by an equivalent method, is: 160 micrograms per cubic meter (0.24 p.p.m.)--maximum 3-hour concentration (6 to 9 a.m.) not to be exceeded more than once per year.

§ 410.11 National primary and secondary ambient air quality standard for nitrogen dioxide.

The national primary and secondary ambient air quality standard for nitrogen dioxide, measured by the reference method described in Appendix F to this part, or by an equivalent method, is: 100 micrograms per cubic meter (0.05 p.p.m.)--annual arithmetic mean.

PROPOSED RULE MAKING
(36 FR 6680, 4-7-71)
ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AMBIENT AIR QUALITY STANDARDS
APPENDIX B - AIR POLLUTION CONTROL REGULATIONS

I. General Provisions.

1.0.17 "Standard Condition" shall mean a dry gas temperature at 70° F. and gas pressure of 14.7 psia.

III. Control of Particulate Emissions.

3.1 Visible Emissions.

3.1.1 Visible emissions restrictions for stationary sources.

No person shall discharge into the atmosphere from any single source of emission whatsoever any air contaminant of a shade or density equal to or darker than that designated as No. 1 on the Ringelmann chart or 20 per cent opacity.

A person may discharge into the atmosphere from any single source of emission for a period or periods aggregating not more than 3 minutes in any 60 minutes air contaminants of a shade of density not darker than No. 3 on the Ringelmann chart or 60 per cent capacity.

3.4 Fuel-Burning Equipment.

3.4.1 No person shall cause or permit emission to the atmosphere from fuel-burning equipment burning solid fuel of particulate matter in excess of 0.10 pounds per million B.t.u. per hour.

3.4.2 No person shall cause or permit emission to the atmosphere, from oil-fired fuel-burning equipment rated greater than or equal to 250 million B.t.u. per hour heat input of particulate matter in excess of 0.025 pounds per million B.t.u. per hour.

3.4.3 For purposes of this regulation the heat input shall be the aggregate heat content of all fuels whose products of combustion pass through a stack or stacks. The heat input value used shall be the equipment manufacturer's or designer's guaranteed maximum input, whichever is greater. The total heat input of all fuel-burning units on a plant or premises shall be used for determining the maximum allowable amount of particulate matter which may be emitted.

NOTE: Section 3.4.1 requires solid fuel-burning equipment to remove about 99 per cent of particulate matter generated by combustion of the average 10 per cent ash coal.

Section 3.4.2 requires removal of about 80 per cent of particulate generated from combustion of high-ash residual fuel oil in large boilers. This can be accomplished by proper design and operation and use of small diameter cyclones and/or electrostatic precipitators or low-ash oil. Additional regulations prohibiting the combustion of solid fuels and/or residual fuel oil in small units may be feasible in some areas and necessary to achieve national air quality standards; for example, prohibition of hand-fired coal-burning units is practiced in several areas.

IV. Control of Sulfur Compound Emissions.

4.1 Fuel Combustion.

4.1.1 No person shall burn, sell, or make available for sale for burning in fuel-burning equipment, any fuel containing in excess of ____* per cent sulfur by weight.

NOTE: This language is intended for application to small area sources where fuel substitution is the only practical control method.

4.1.2 No person operating power and steam-generating facilities having a power-generating capacity in excess of 25 megawatts or a heat input greater than 250 million B.t.u./hr. shall emit in excess of ____* pounds of sulfur per million B.t.u. of heat input per hour.

NOTE: This language is intended for application to large fuel-combustion sources, where installation of flue gas-cleaning systems is feasible.

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* It is not possible to make nationally applicable generalizations about attainable degrees of control of sulfur oxides emissions from combustion sources. Availability of low-sulfur fuels varies from one area to another. In some areas, severe restrictions on the sulfur content of fuels could have a significant impact on fuel-supply patterns; accordingly, where such restrictions are necessary for attainment of national ambient air standards, adoption of phased schedules of sulfur-in-fuel limitations is recommended. Stack gas cleaning is feasible at large industrial combustion sources and steam electric powerplants. Technology now being demonstrated will allow 80 per cent removal of sulfur oxides from combustion gases of most existing boilers. It is reasonable to expect that these processes will be improved in the near future and thus permit attainment of 90 per cent or greater collection efficiency at a wide range of boilers.

VII. Control of Nitrogen Oxides Emissions.

7.1 Combustion Sources.

7.1.1 No person shall cause or permit emissions of nitrogen oxides from an oil or gas-fired boiler with a capacity of 250 million B.t.u./hr. or more and completed before the effective date of this regulation in excess of 0.30 pounds per million B.t.u. of heat input per hour.

7.1.2 No person shall cause or permit emissions of nitrogen oxides from a coal-fired boiler with a capacity of 250 million B.t.u. per hour or more in excess of 0.9 pounds per million B.t.u. of heat input per hour.

NOTE: The proposed requirement for oil and gas-fired plants is about equivalent to 200 p.p.m. by volume at 3 per cent oxygen. The requirement for coal-fired plants is about equivalent to 500 p.p.m. by volume. These levels are expected to be achieved by design and operation changes in firing boilers.

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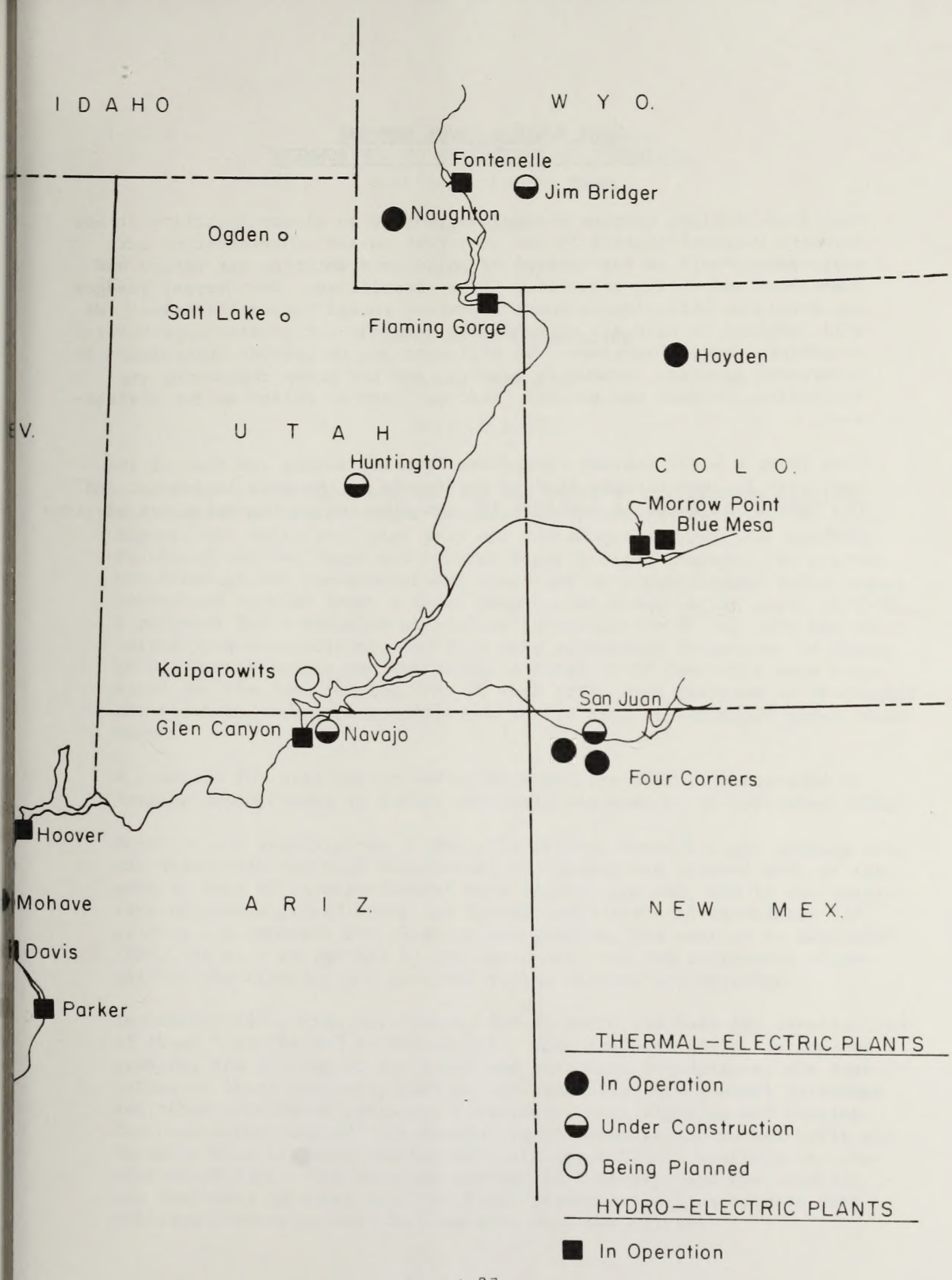
Alternative means of meeting requirements for the control of sulfur oxides emissions from fuel combustion sources include: Use of natural gas, distillate oil, low-sulfur coal, and low-sulfur residual oil; desulfurization of oil or coal; stack gas desulfurization; and restricted use, shutdown, or relocation of large existing sources.

In many areas of the country, regulations can be written requiring the following fuel characteristics: Distillate oil - 0.1 per cent sulfur; residual oil - 0.3 per cent sulfur; bituminous coal - 0.7 per cent sulfur. Because residual oil generally is obtained from overseas sources, its use ordinarily is restricted to areas accessible to water-borne transportation. There are limited tonnages of 0.7 per cent sulfur coal available at the present time but only in certain areas of the country.


IDAHO
WYO.
Fontenelle
Jim Bridger
Naughton
Ogden
Salt Lake
Flaming Gorge
Hayden
EV.
UTAH
Huntington
COLO.
Morrow Point
Blue Mesa
Kaiparowits
San Juan
Glen Canyon
Navajo
Four Corners
Hoover
Mohave
ARIZ.
NEW MEX.
Davis
Parker
THERMAL-ELECTRIC PLANTS
In Operation
Under Construction
Being Planned
HYDRO-ELECTRIC PLANTS
In Operation

UTAH POWER & LIGHT COMPANY
STATEMENT ON PROTECTION OF ENVIRONMENT

1-14-71
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Utah Power & Light Company recognizes that as an electric utility it has definite responsibilities in the preservation and enhancement of our environment--both in the control of pollutants entering our waters and atmosphere and in the appearance of our facilities. Our Company pledges its continued attention to these important social responsibilities. We will continue to make all economically feasible and prudent expenditures to achieve these objectives. We will continue to provide information to Government agencies, community leaders, and the press concerning any activities, present and planned, that may have an effect on our environment.

Utah Power & Light Company recognizes that its future and that of its employees is inextricably tied to the future of the area it serves, and the Company is eager to continue its contribution to improving our environment.

CONSTRUCTION PROGRESS SUMMARY

Huntington Canyon Plant

Unit No. 2

July 1, 1971

Stearns-Roger Corporation

Denver, Colorado

Project B39050

A contract for design, engineering and resident engineering services was awarded to Stearns-Roger Corporation in late March 1970. By early August, the basic site plot plan and finish grade elevations had been developed and were approved by Utah Power & Light Company. To confirm the findings and recommendations contained in a preliminary soils report authorized by Utah Power & Light Company and submitted in April of 1970, a proposal for a detailed subsurface investigation of the site was obtained from a consultant, and they were authorized to proceed in August 1970. During August and September, a total of 55 test pits were excavated and the core samples from 20 test holes were analyzed to thoroughly establish the subsurface conditions in the area of all major plant structures.

A contract for site survey and staking and for aerial photography to develop contour maps at 2-foot intervals was awarded in September 1970.

Prior to the acquisitions of the site by Utah Power & Light Company from the State Fish and Game Department, the agency had claimed most of the area as part of an experimental deer feeding program, and it was necessary to remove ground cover and downed trees prior to excavation and grading. A contract for clearing and grubbing was awarded in September 1970, the site was staked by the surveyors, and the contractor accomplished the clearing and grubbing during October and November.

In October 1970, bids were taken, and an award was made for construction of Phase I of the 345 kv Switchyard. This included site clearing and grading, the placing of equipment and structure foundations, the installation of shunt reactors, carrier and communications control buildings and other switchyard equipment structures, area lighting and fencing. The contractor started this excavation in November and worked until mid December when freezing weather made it impossible to continue the compaction of fill. The work was resumed in February, and the contract was completed in June, when the first transmission line between Camp Williams substation and the 4-corners area was charged.

Bids for the earthwork and the plant access roads required prior to placing the foundations for the major equipment and structures were taken in February 1971, and the contractor started work at the site on March 8. The approximate quantities for this contract are as follows:

| | |
|---|---|
| Excavation | 874,000 Cu. Yds. |
| Fill Material | |
| Structural | 217,000 Cu. Yds. |
| Class I & Class II | 436,000 Cu. Yds. |
| Roadway Subgrade | 9,200 Sq. Yds. |
| Aggregate Surfacing | 8,300 Sq. Yds. |
| Stripping | 484,000 Sq. Yds. |
| Finish Grading | 192,000 Sq. Yds. |

On June 1, the overall contract was approximately 70 per cent complete and is scheduled to be finished about August 1.

To mix and deliver to the forms the approximately 35,000 cubic yards of concrete estimated for the first unit and the administration, shop and warehouse building, bids were taken and an award for concrete supply was made in April 1971. The contractor is presently on site assembling a batching plant, erecting silos for cement storage and stockpiling sand and aggregates, and will be prepared to deliver concrete by July 15.

Bids were taken on a Site Development Contract, and an award for the work was made on June 3. The contractor has moved on site and has begun the trenching and laying of the domestic water supply piping. The contract also includes the installation of construction sanitary facilities, sanitary sewer system, guard houses, chain-link fencing and related electrical work.

Bids were received on May 24, 1971, for the Administration Building and related facilities. An award was made on June 15, and the contractor moved on site on June 28. The shop and warehouse will be used as a construction warehouse by the General Contractor, and the facility is scheduled to be ready to occupy in early January 1972.

During the fall of 1970, Utah Power & Light Company furnished sections of corrugated metal pipe, which were placed and covered by the Emery County Highway Department in December 1970 to provide a new crossing of Huntington Creek, suitable for heavy loads on the Deer Creek Canyon road from which access is obtained to both the 345 kv Switchyard and the plant area.

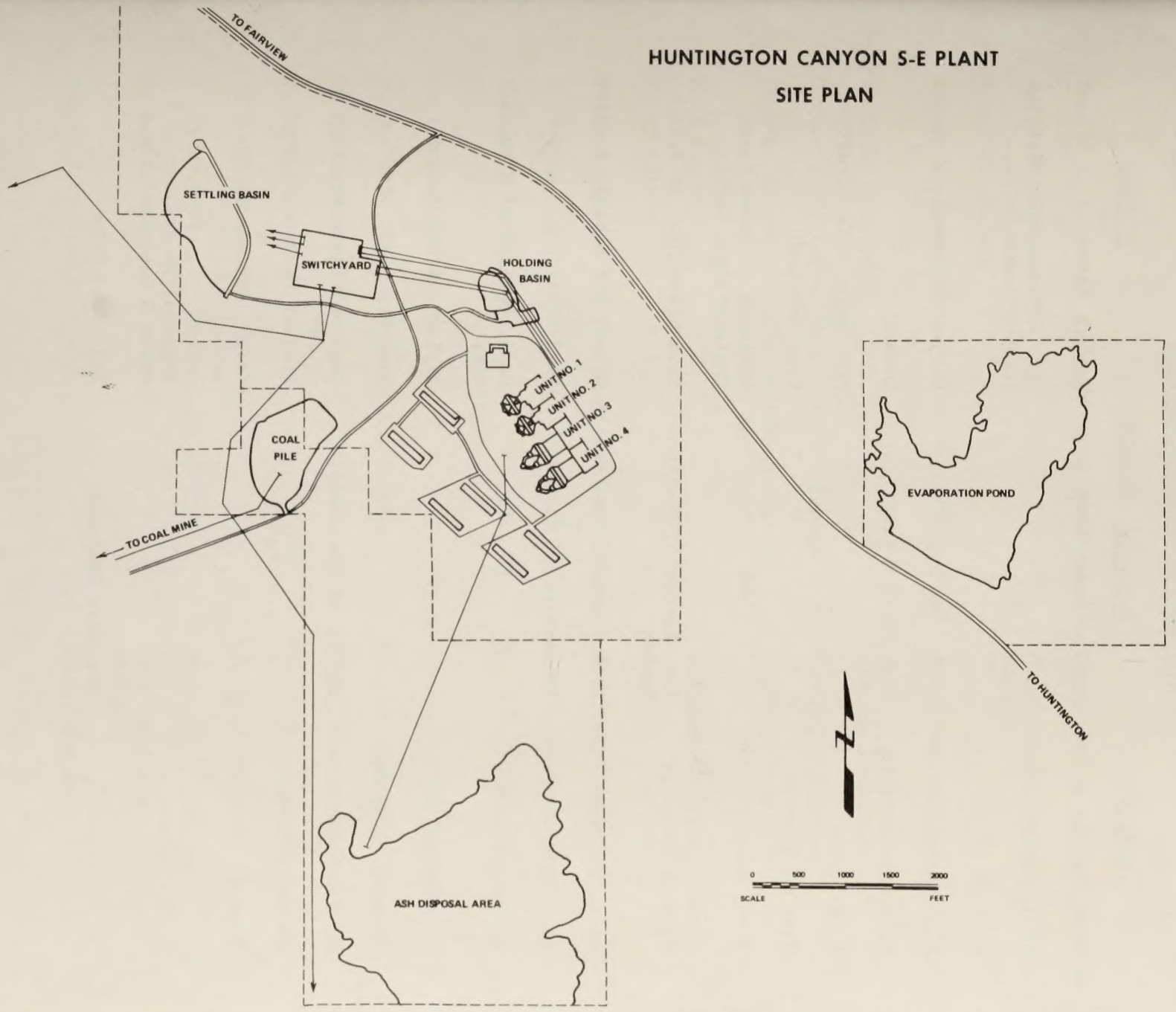
Construction power and lighting have been installed on the site by Utah Power & Light construction forces and are being utilized by the contractors and the site office of Stearns-Roger resident personnel.

Bids will be taken during July for the major concrete substructures and in January 1972 for a General Contract for the balance of the work required for the first Unit.

The construction is presently on schedule to meet the trial operation date of March 1, 1974.


SALT LAKE CITY
CAMP WILLIAMS
PROVO
SALT LAKE CO.
UTAH CO.
TOOELE CO.
40 MILES
GOSHEN
UTAH CO.
JUAB CO.
NEPHI
60 MILES
MOUNT PLEASANT
SANPETE CO.
JUAB CO.
EMERY CO.
SANPETE CO.
CARBON CO.
EMERY CO.
HUNTINGTON
57 MILES
GREEN RIVER
45 MIL
GRAND CO.
EMERY CO.
GREAT SALT LAKE
UTAH LAKE
UINTA NATIONAL FOREST
ASHLEY NATIONAL FOREST
ROCKY MOUNTAIN FOREST RESERVE
UINTA NATIONAL FOREST


LEGEND
PROPOSED 345 KV LINE
TERMINAL-SIGURD 230 KV LINE
INDIAN RESERVATION LANDS
COUNTY LINES
FOREST LAND
MOAB
56 MILES
GRAND CO.
SAN JUAN CO.
MONTEZUMA CO. COLORADO
SAN JUAN CO. UTAH
MONTICELLO
47 MILES
BLANDING
25 MILES
27 MILES
SAN JUAN STA.
FOUR CORNERS STA.
SHIPROCK STA.
UTAH POWER & LIGHT COMPANY
CAMP WILLIAMS – FOUR CORNERS
345 KV LINE
NO SCALE
OCT. 1969


HUNTINGTON CANYON S-E PLANT
SITE PLAN
TO FAIRVIEW
SETTLING BASIN
SWITCHYARD
HOLDING BASIN
UNIT NO. 1
UNIT NO. 2
UNIT NO. 3
UNIT NO. 4
COAL PILE
TO COAL MINE
EVAPORATION POND
TO HUNTINGTON
ASH DISPOSAL AREA
0 500 1000 1500 2000
SCALE FEET

PRELIMINARY ENVIRONMENTAL DISCUSSIONS
WITH GOVERNMENT OFFICIALS

6-5-70
JCC/s

| Name | Employer | Title |
|---|---|---|
| D. M. Mills | Stearns-Roger Corp. | Project Exec. |
| R. M. Christiansen | " " " | Mgr. Environmental Science Stearns-Roger Corp. |
| H. J. Bell | " " " | |
| H. L. Dwyer | " " " | Project Manager |
| H. C. Crutchfield | Utah Power & Light Co. | Chemist |
| F. N. Davis | " " " " | Mgr. Engr. & Construction |
| John S. Anderson | " " " " | Vice President |
| J. C. Conder | " " " " | Director of Steam Plant Engineering & Constr. |
| Lynn M. Thatcher | Dir. Bureau of Environ-Health | Utah State Div. of Health |
| Grant S. Winn | Utah State Div. of Health | Chief, Air Quality Section |
| Alex G. Oblad | University of Utah | Prof. Fuel Eng. |
| George R. Hill | " " | Dean, College of Mines & M.I. |
| A. Clyde Hill | " " | Biological Department |
| Raymond L. Hixson | " " | Dir. Eng. Exp. Station |
| D. L. Crandall | Bureau of Reclamation | Regional Director, Reg. 4 |
| Palmer DeLong | " " | Project Manager, Provo |
| Read L. Black | " " | Chief, Irrigation Div. Provo |
| L. E. Holmes | " " | Regional Supervisor of Water & Land Operations |
| J. S. McMaster | Regional Solicitor | Salt Lake City |

PRELIMINARY ENVIRONMENTAL DISCUSSIONS WITH GOVERNMENT OFFICIALS

12-2-70

| Name | Employer | Title |
|---|---|---|
| Dorald M. Allred | Brigham Young University | Dir., Center of Env. Studies |
| Eugene C. Davenport | " " " | Limnologist, Center of Env. Studies |
| Robert N. Winget | " " " | " " " |
| Robert W. Scott | Bureau of Sport Fisheries & Wildlife | Field Supervisor |
| Lewis D. Richardson | " " " | Fishery Biologist |
| Gordon E. Harmston | Dept. of Nat. Resources | Executive Director |
| Mark H. Hooper | Air Pollution Control Office, EPA | Chemical Engr., N. C. |
| Earl Porter | " " " | Regional Director, Denver |
| Hirsh Slater | " " " | Meteorologist, N. C. |
| Einar L. Hovind | No. American Weather Cons. | Dir., Air Pollution |
| John Bene | State of Utah | Deputy State Engineer |
| Kenward H. McKinney | " " - Div. of Water Rights | Area Engineer, Price |
| Earl Staker | " " " " | Appropriation Engineer |
| H. J. Bell | Stearns-Roger Corp. | Project Engineer |
| R. M. Christiansen | " " " | Mgr., Environ. Science |
| H. L. Dwyer | " " " | Project Manager |
| D. N. Nills | " " " | Project Exec. |
| A. Clyde Hill | University of Utah | Associate Professor |
| George R. Hill | " " | Dean, College of Mines & Minerals |
| Robert G. Larsen | " " | Dir., Engr. Exp. Sta. |

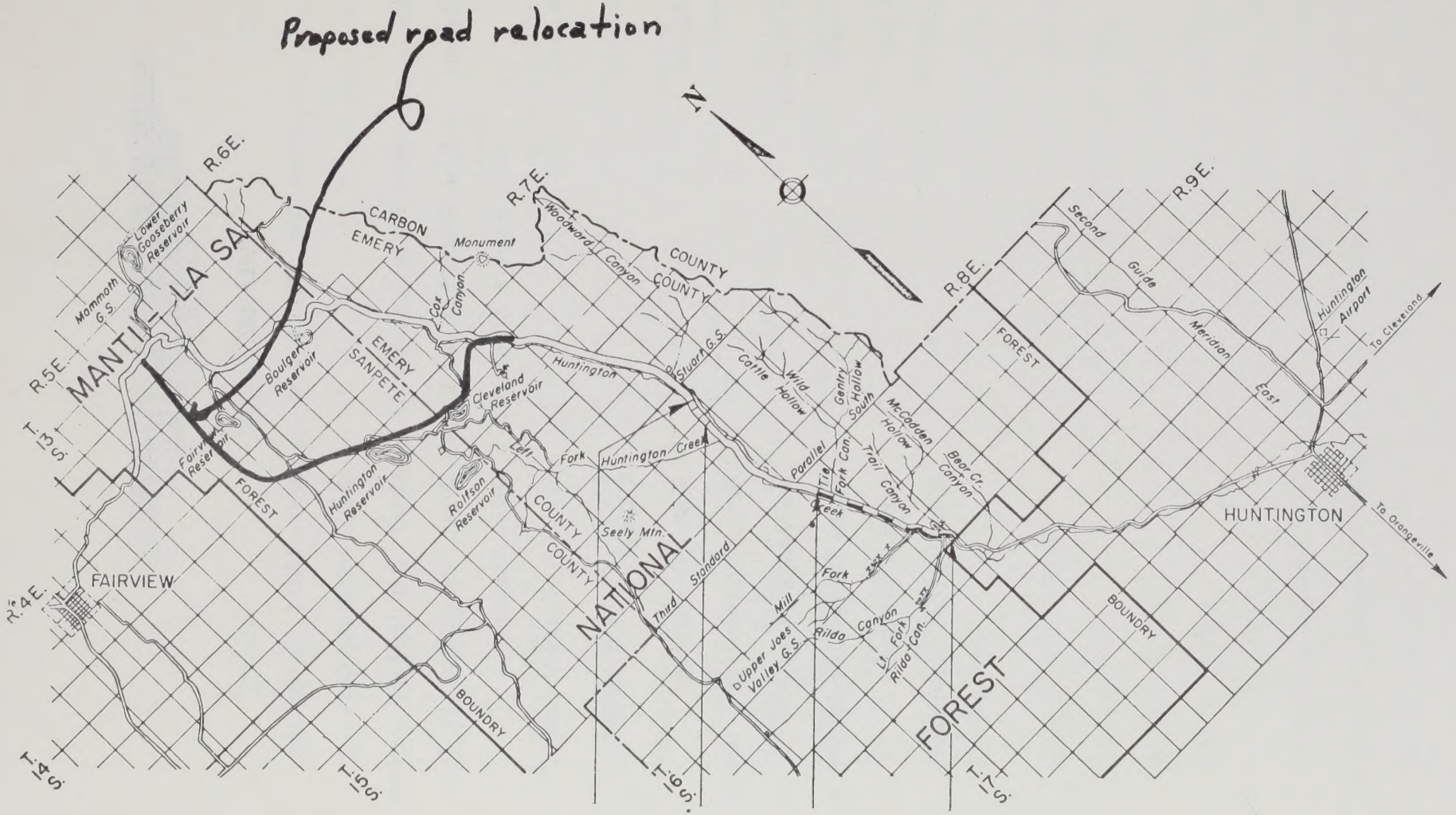
PRELIMINARY ENVIRONMENTAL DISCUSSIONS
WITH GOVERNMENT OFFICIALS
(Cont'd.)

| Name | Employer | Title |
|---|---|---|
| Alex G. Oblad | University of Utah | Prof., Metal & Fuel Eng. |
| Carl A. Ruscetta | " " | Asst. Dir., Exp. Station |
| D. L. Crandall | Bureau of Reclamation | Regional Director, Reg. 4 |
| Read L. Black | " " | Chief, Irrigation Division Provo |
| L. E. Holmes | " " | Regional Supervisor of Water & Land Operations, SLC |
| Alden E. Orr | " " | Water & Land Oper., SLC |
| Harold N. Sersland | " " | Environmental Specialist |
| S. R. Wilson | Bureau of Mines | Liaison Officer--Utah Sect. |
| Thomas O. Parker | Dept. of the Interior | Regional Solicitor |
| Henry Chrostowski | Forest Service | Fishery Biologist |
| Otis L. Copeland | " " | Asst. Dir., Intermtn. Sta. |
| Evan I. DeBloois | " " | Ogden Regional Archaeologist |
| Rex Naanes | " " | Branch Chief, Div. of Soil and Water |
| Gary L. Richardson | " " | Wildlife Biologist |
| A. M. Revas | " " | Branch Chief, Reg. Office |
| Ed Schlatterer | " " | Ecologist |
| Dee B. Thomas | " " | Price Hydrologist |
| C. A. Wellner | " " | Asst. Dir., Intermtn. Sta. |
| Russell W. Cruff | Geological Survey, WRD | Asst. District Chief |
| Albert W. Heggen | Utah Div. Fish & Game | Chief, Research |
| Russell Henshaw | " " " " | Pollution Biologist |

PRELIMINARY ENVIRONMENTAL DISCUSSIONS
WITH GOVERNMENT OFFICIALS
(Cont'd.)

| Name | Employer | Title |
|---|---|---|
| Bill Tate | Utah Div. Fish & Game | Asst. Chief, Fisheries |
| Jay R. Udy | " " " " | Chief of Field Services |
| Grant S. Winn | Utah State Dir. Health | Chief, Air Quality Section |
| Calvin K. Sudweeks | Utah State Div. of Health | Chief, Water Quality Sect. |
| H. Boehmer | Utah Power & Light Co. | Chief Engineer |
| Ross G. Bosen | " " " " | Steam Production Supvr. |
| J. C. Conder | " " " " | Dir., Powerplant Engr. & Constr. |
| H. C. Crutchfield | " " " " | Chemical Engineer |
| F. N. Davis | " " " " | Mgr., Engineering & Constr. |
| J. Harold Hutchinson | " " " " | Mechanical Engineer |
| K. M. Neuschwander | " " " " | Steam Production Engineer |
| Robert B. Porter | " " " " | Legal Department |
| D. J. Watkins | " " " " | Hydrological Supervisor |

# MANTI-LA SAL NATIONAL FOREST
## EMERY COUNTY




FAIRVIEW-HUNTINGTON CANYON

A-47

## LIST OF MAMMALS OCCURRING IN HUNTINGTON CANYON HEADWATERS

| | |
|---|---|
| Dusky shrew | Sorex obscurus |
| Water shrew | Sorex palustris |
| Big myotis | Myotis lucifugus |
| Hairy-winged myotis | Myotis volans |
| Snowshoe rabbit | Lepus americanus |
| White-tailed jack rabbit | Lepus townsendii |
| Red squirrel (Chickaree) | Tamiasciurus hudsonicus |
| Yellow-bellied marmot | Marmota flaviventer |
| Uinta ground squirrel | Citellus armatus |
| Rock squirrel | Citellus variegatus |
| Golden-mantled ground squirrel | Citellus lateralis |
| Least chipmunk | Eutamias minimus |
| Cliff chipmunk | Eutamia dorsalis |
| Say chipmunk | Eutamias quadrivittatus |
| Northern flying squirrel | Glaucomys sabrinus |
| Northern pocket gopher | Thomomys talpoides |
| Botta pocket gopher | Thomomys bottae |
| Beaver | Castor canadensis |
| Deer mouse | Peromyscus maniculatus |
| Brush mouse | Peromyscus boylii |
| Bushy-tailed wood rat | Neotoma cinerea |
| Red-backed mouse | Clethrionomys gapperi |
| Muskrat | Ondatra zibethicus |
| Pennsylvanian meadow mouse | Microtus pennsylvanicus |

## LIST OF MAMMALS OCCURRING IN HUNTINGTON CANYON HEADWATERS (Cont'd.)

| | |
|---|---|
| Montane meadow mouse | Microtus montanus |
| Long-tailed meadow mouse | Microtus longicaudus |
| Big jumping mouse | Zapus princeps |
| Porcupine | Erethizon dorsatum |
| Coyote | Canis latrans |
| Black bear | Ursus americanus |
| Long-tailed weasel | Mustela frenata |
| Mink | Mustela vison |
| Marten | Martes caurina |
| Badger | Taxidea taxus |
| Bobcat | Lynx rufus |
| Mountain lion | Felis concolor |
| Wapiti (Elk) | Cervus canadensis |
| Mule deer | Odocoileus hemionus |
| Striped skunk | Mephitis mephitis |

## FISHES OF THE HEADWATERS OF HUNTINGTON CANYON

| | |
|---|---|
| Cutthroat trout | Salmo clarki |
| Brown trout | Salmo trutta |
| Rainbow trout | Salmo gairdneri |
| Brook trout | Salvelinus fontinalis |
| Speckled dace | Rhinichthys osculus |
| Mountain sucker | Catostomus platyrhynchus |
| Mottled sculpin | Cottus bairdi |

MR. R. D. ELLIOTT'S SUMMARY ON RESULTS OF METEOROLOGICAL

SURVEY OF THE HUNTINGTON CANYON PLANTSITE

Conducted by

NORTH AMERICAN WEATHER CONSULTANTS

for

UTAH POWER & LIGHT COMPANY

REVISED STATEMENT

August 11, 1971

An in-depth meteorological survey of the planned Huntington Canyon Plantsite and environs which was commenced in mid-December 1969 has presently been completed. It has consisted of a three-dimensional sampling of the wind flow and temperature structure up and down canyon from the planned site in order to obtain a basis for calculating the power of the local atmosphere to disperse the effluent from the planned first unit of the coal-fired powerplant.

A meteorological instrument complex was located near the proposed site in December 1969 and has been collecting wind, temperature, and humidity data continuously since then.

An aircraft equipped with an aerometeorograph made soundings on a schedule of at least two per week from March 1970 to date.

Starting in August 1970, a series of intensive collection of meteorological data were made on four separate weeks. Balloon borne radiosondes and wind soundings were made during various parts of each day. Constant volume balloons were tracked as they drifted up and down the canyon. Crews were dispatched to the area to carry out these data collections during August 1970, September 1970, December 1970, and late in January and early in February 1971.

The data collected by these three different procedures were analyzed by computer programs which predict what $SO_2$ concentrations could be expected at various distances from the plant on the basis of the meteorological and engineering data fed into them. The effects of using several different engineering parameters, such as stack height, effluent $SO_2$ concentration, and gas exit velocity, were computed under varying observed atmospheric conditions. Estimates were formed of the frequency with which certain maximum $SO_2$ concentrations could occur.

On the basis of these computations, using accepted numerical dispersion models and a recommended 600-foot stack height, the expected $SO_2$ ground concentration values from the first unit would be as follows:

1. Annual Average Values (Figure 1)

   The maximum annual average $SO_2$ ground concentration level is estimated not to exceed 0.003 parts per million (p.p.m.) by volume at any distance from the plant. This is nearly one seventh of the 0.020 p.p.m. allowed by State regulation.

2. Daily Average Values (Figure 2)

   A maximum daily average $SO_2$ ground concentration level of 0.013 to 0.016 p.p.m. can be expected within the nearest 3 miles of the plant. This is nearly one sixth of the .10 p.p.m. allowed by State regulation.

3. Half-Hourly Values (Figure 3)

   A maximum half-hourly $SO_2$ ground concentration level of 0.10 p.p.m. can be expected within the nearest two miles of the plant. The State regulation permits a half-hour concentration of 1.00 p.p.m. to occur up to twice in one day, and .50 p.p.m. up to five times per day, and the computed maximum values are well below these limits.

The values presented in Figures 1-3 are based upon the meteorological conditions which are found to prevail in the canyon. The study shows that the site is unique in that during much of the time either strong down-canyon or up-canyon winds prevail, thus enhancing the power of the atmosphere to disperse any effluent introduced into it.

However, the analysis also shows the potential of limited dispersion under stable winter airmass conditions with low wind speeds. A test comparing general meteorological conditions over Utah during a ten-year historical period with those which occurred during the sampling period showed that the prevalence of conditions favoring restricted dispersion of effluent during the 15 months of observations occurred with about the average frequency found during the ten historical years. The average occurence is 6 periods per year of 2-4 days' duration.

No standard evaluation techniques are presently available for plume dispersion under this condition; however, a special analysis was made based upon a simple mixing model, though better definition of meteorological parameters is required for such computations than could be obtained during the 1970-71 field trips.

The computational results for one unit is presented in Figure 4, showing peak values ranging between 0.09 p.p.m. and 0.36 p.p.m. These were all

of short duration and limited to the one to two-hour period following the transition to up-canyon flow. Estimates of maximum daily average $SO_2$ values indicate that they would fall well within the state limits, even during the most adverse mixing conditions encountered at the site.

Furthermore, the contribution to the annual $SO_2$ average values in Figure 1 would be insignificant in view of the low yearly frequency of occurrence of this condition.

The computational results presented in Figures 1-4 are based upon atmospheric dispersion processes only, with no consideration given to plume deposition or sink effects associated with the surrounding vegetation. The latter may be of particular importance in removing $SO_2$ from the air during stagnant conditions.

The conclusion is drawn that on the basis of the meteorological conditions observed and the proposed engineering design features, the maximum concentrations of $SO_2$ which could be expected at ground level downwind of the first unit would be far below the limits allowed under State regulations.

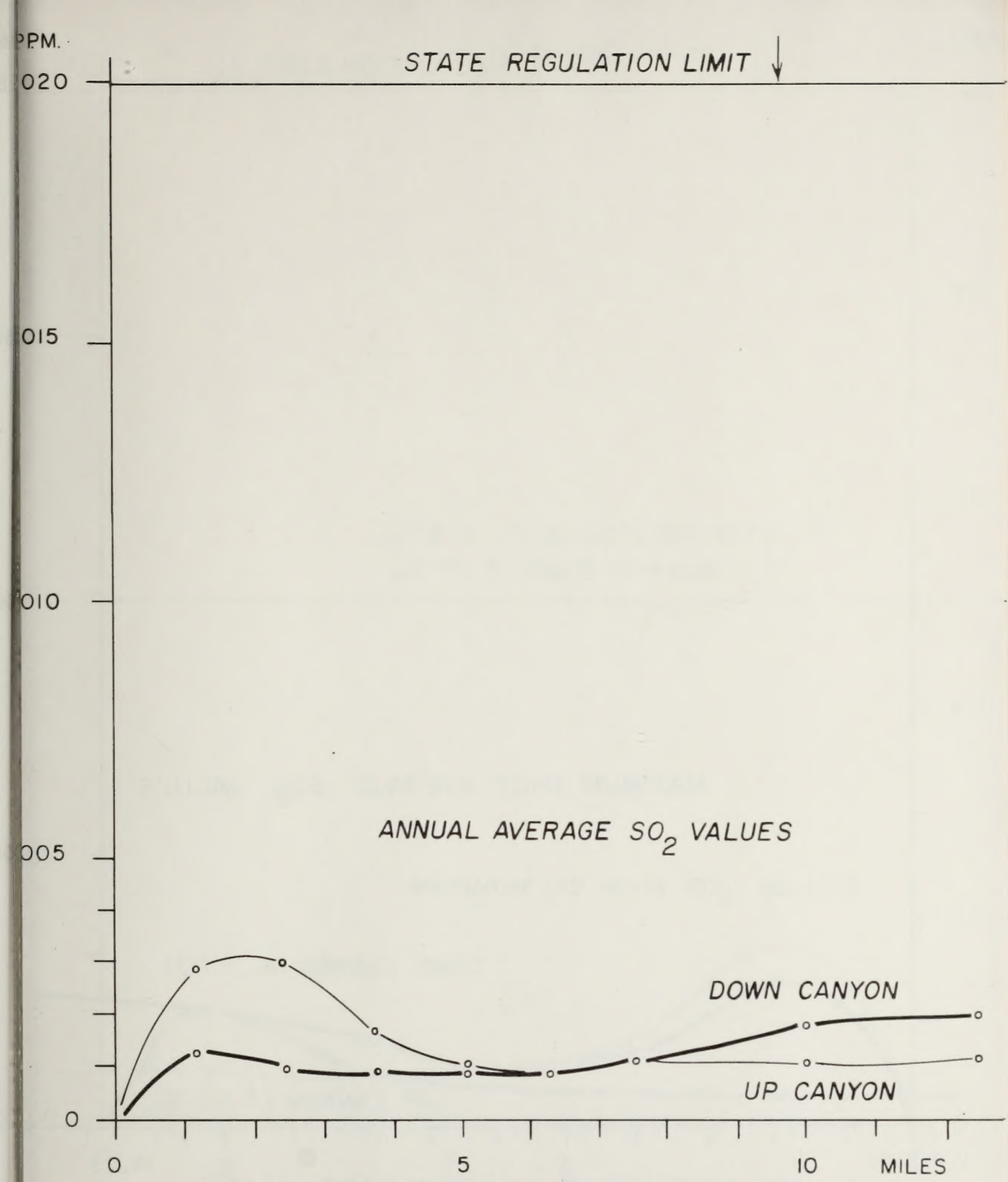



Fig. 1. Annual average $SO_2$ concentration values verses distance from a single unit with a 600-foot stack based upon 1970-71 meteorological data. The values were estimated from the annual frequency distributions of dispersion conditions within a 40° sector for up-canyon and 30° sector for down-canyon flow.

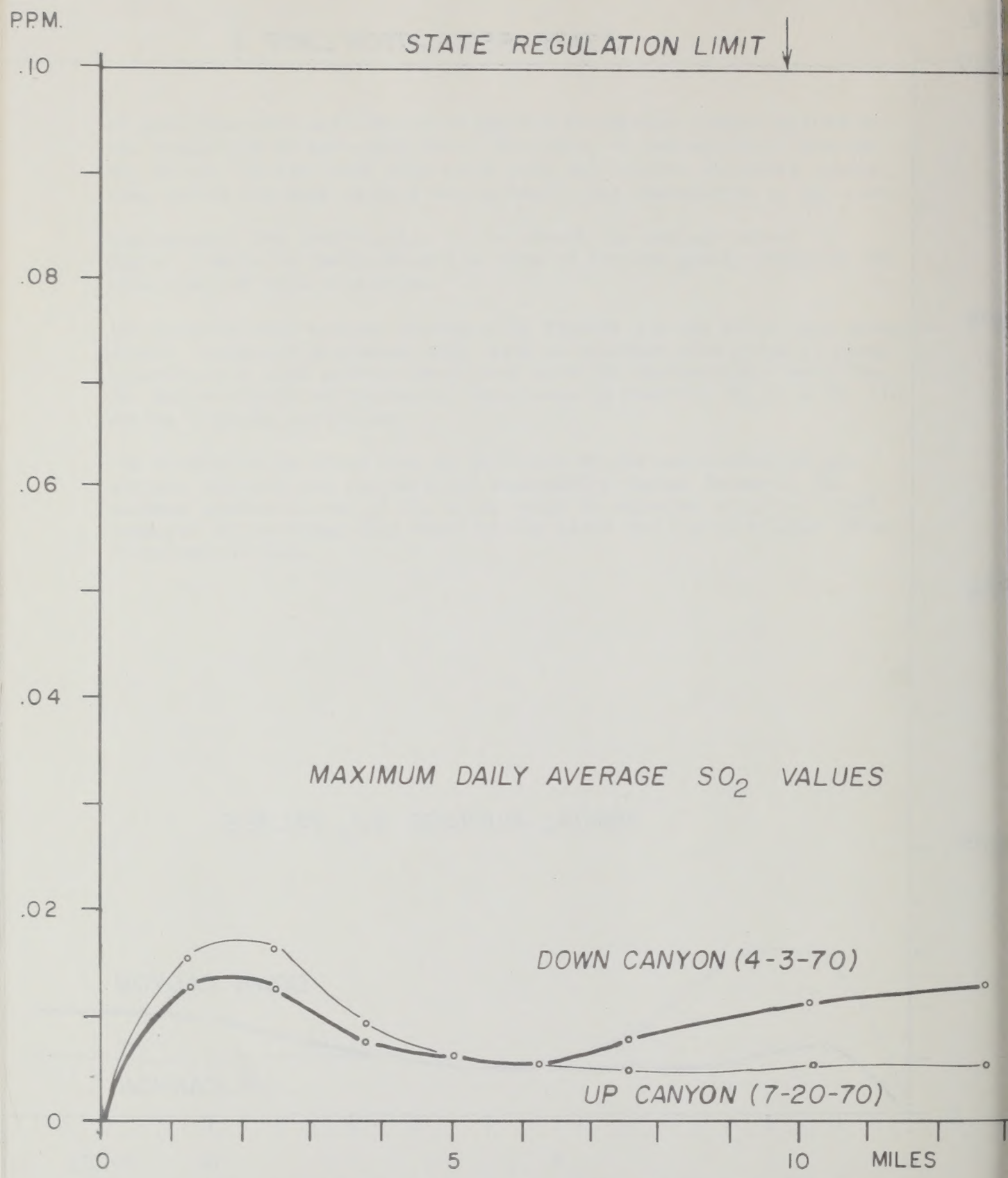



Fig. 2. Maximum daily average $SO_2$ concentration values verses distance from a single unit with a 600-foot stack. The values were estimated by assuming the plume centerline remaining along a constant direction for the most persistent 24-hour condition which could be found for up or down-canyon flow (respectively July 20, 1970, and April 3, 1970).

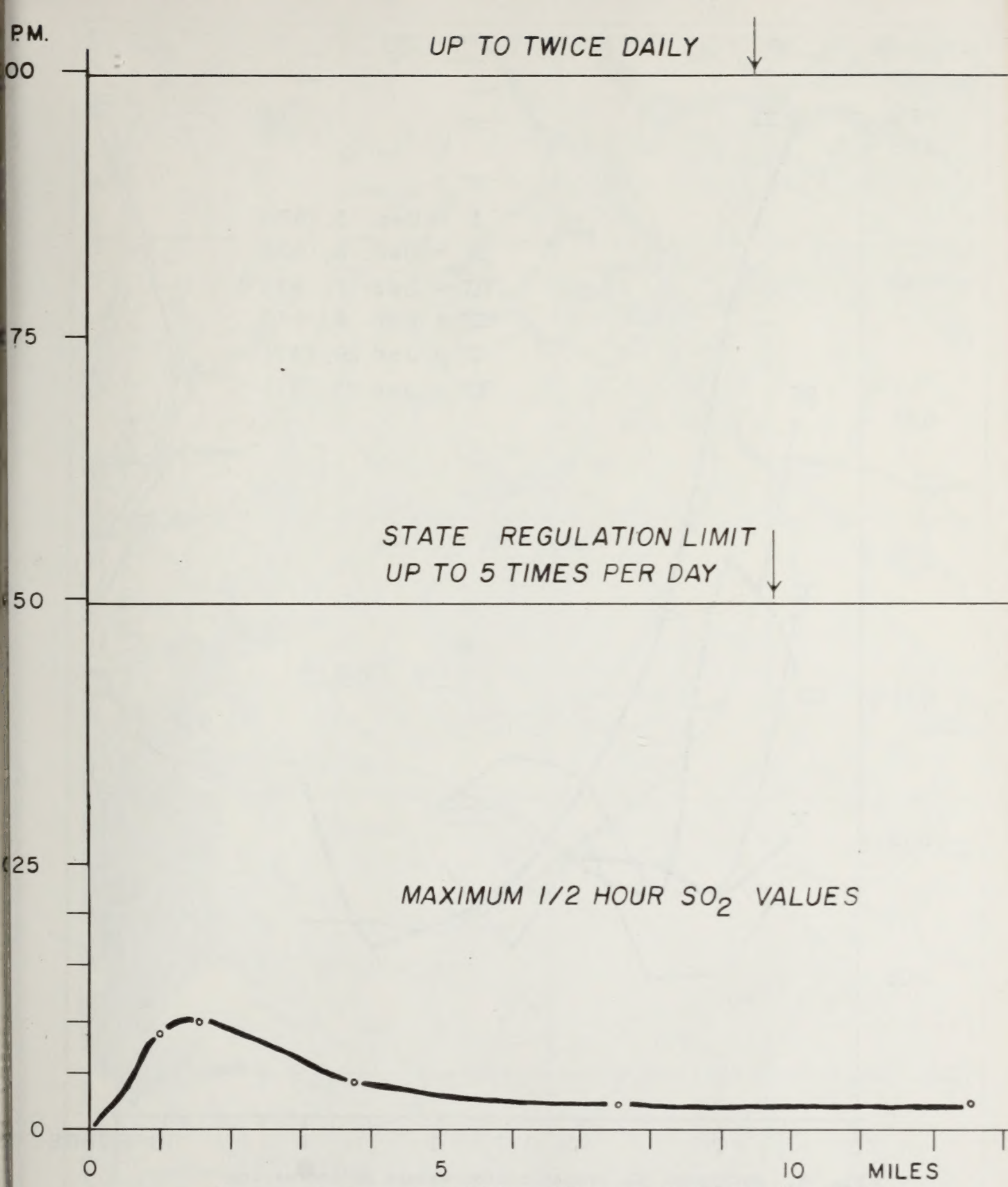



Fig. 3. Maximum one-half hour $SO_2$ concentration values verses distance from a single unit with a 600-foot stack based upon 1970-71 meteorological data. The values closest to the plant-site are associated with unstable and beyond five miles with neutral airmass dispersion conditions.

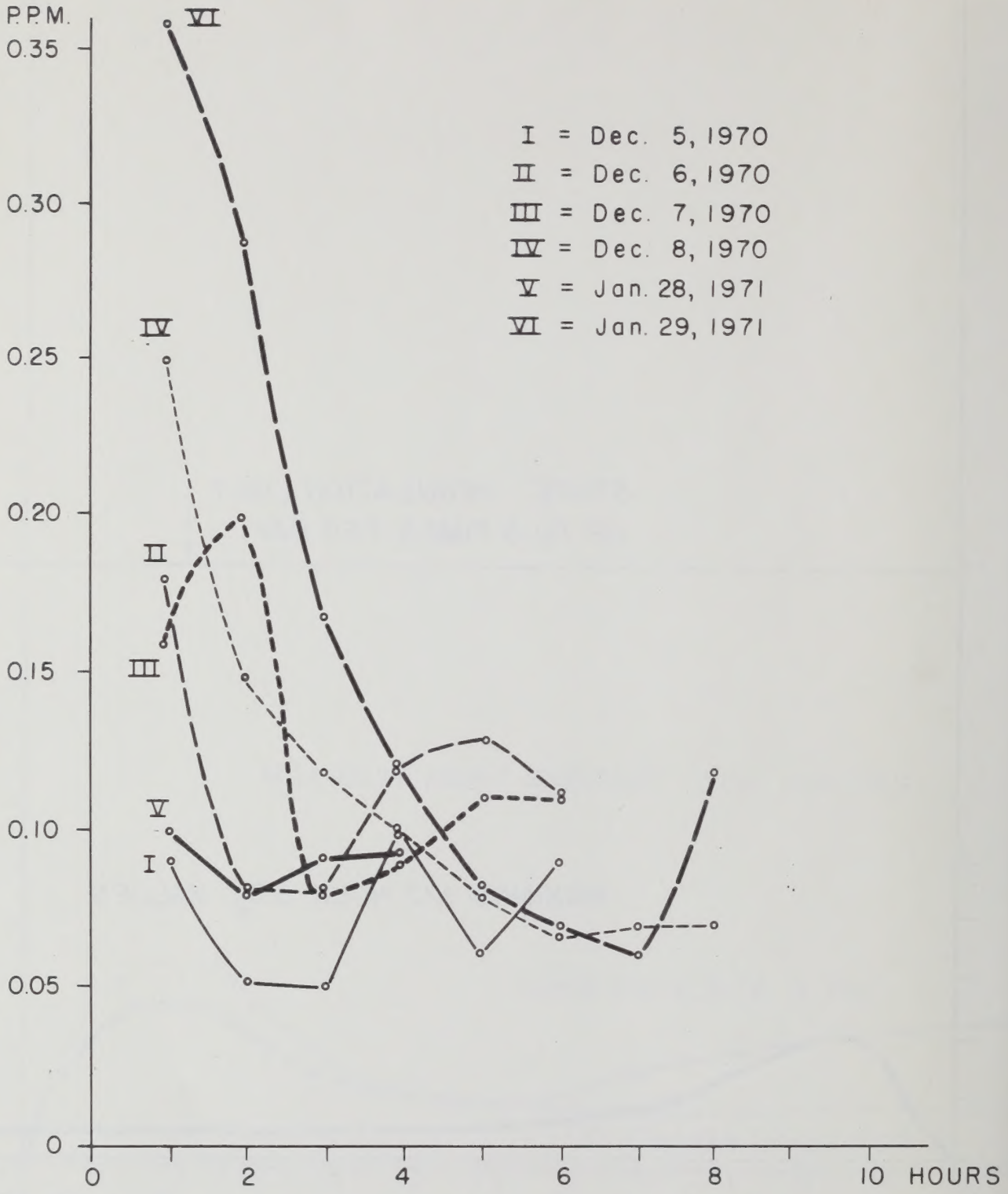



Fig. 4. Estimated $SO_2$ concentration values at increasing hours following onset of up-canyon flow during indicated days of potential airmass stagnation in Huntington Canyon. Note that the peak values were restricted to short periods around the transition in canyon flow.

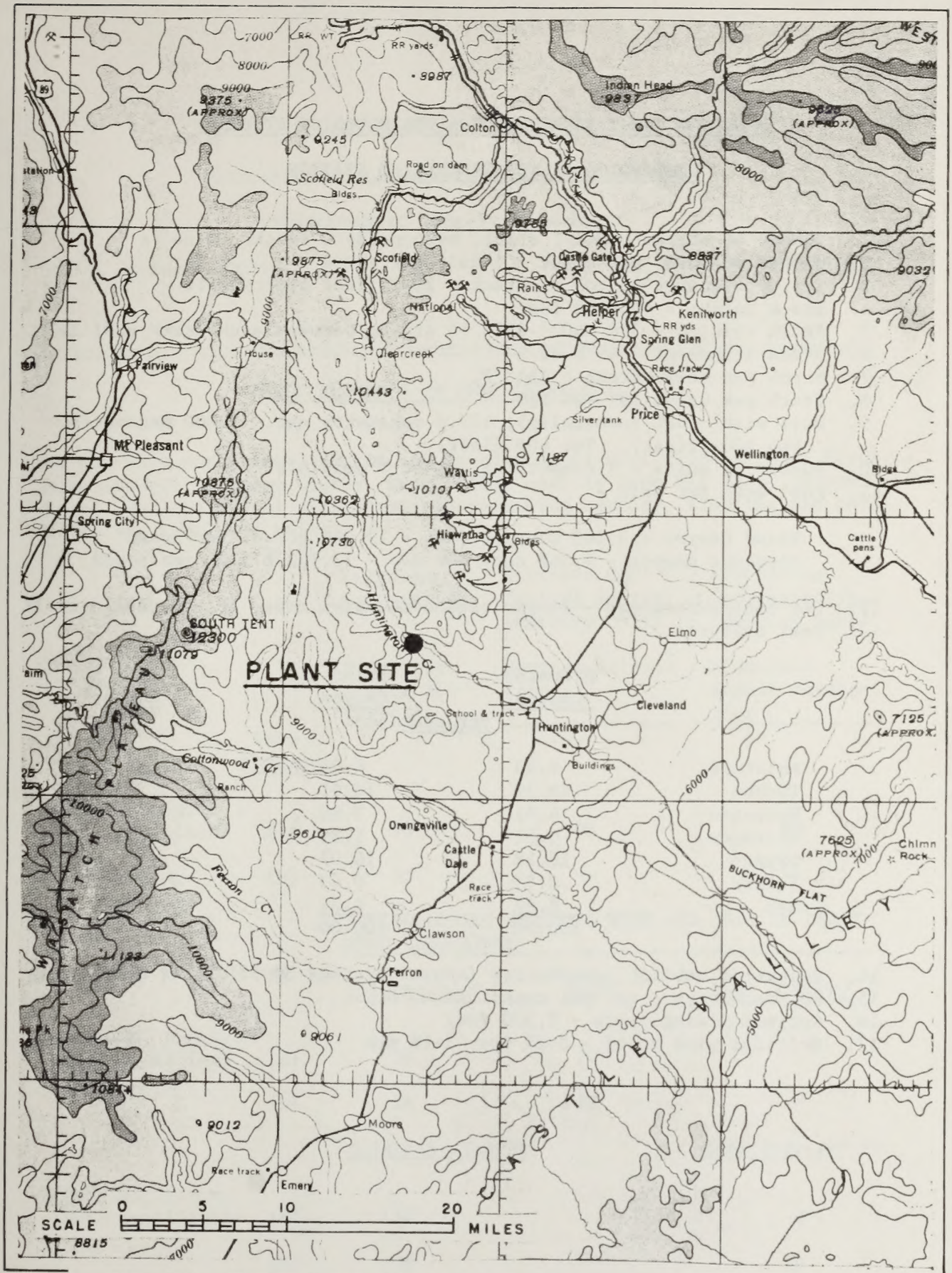



Fig. 2.1 Regional map showing the Huntington Canyon plant site in relation to the Wasatch Plateau and Huntington, Utah.

## MODELING INPUT FURNISHED TVA FOR MODELING STUDIES

## HUNTINGTON CANYON GENERATING STATION

1. Number of stacks - Now 1 stack, eventually 4 stacks, 4 units
2. Number of units per stack - 1 unit per stack
3. Inside diameter at top of stack - 20-25 feet approximate
4. Stack height - 400-600 feet
5. Stack spacing - 350'-400'-350' (4 stacks between each stack endline)
6. Stack alinement - 45°W of N
7. Stack gas temperature - 254° F.
8. Stack gas velocity - 80 fps
9. Unit size - 400 (nominally), 427.8 megawatts net. 2,000 megawatts. Two 400 (first). Two 600 (last).
10. Number of units - 1 committing, up to 4 possible
11. Coal burn per unit -

    Blind Canyon - 3,840 tons per day - 12,944 B.t.u. per pound
    Hiawatha Canyon - 4,068 tons per day - 12,192 B.t.u. per pound

12. Per cent excess air - 21 per cent combustion zone, 26 per cent overall
13. Coal analysis -

| | Hiawatha Canyon | Per cent | Blind Canyon | Range |
|---|---|---|---|---|
| Moisture | 6.43 | | 6.04 | 4.0-9.0 |
| Carbon | 68.30 | | 70.61 | |
| Hydrogen | 4.91 | | 5.40 | |
| Nitrogen | 0.81 | | 1.23 | |
| Oxygen | 10.18 | | 10.07 | |
| Sulfur | 0.55 | | 0.43 | 0.32-0.80 |
| Ash | 8.82 | | 6.22 | 5.0-11.0 |
| | 100.00 | | 100.00 | |

14. Suggested ambient temperature (annual average 50-53° F. at Navajo)
15. $SO_2$ scrubbers - not yet committed
16. Optimum mixing depth - 2,500 feet
17. Critical wind speed - 8-28 fps, 5-18 mph

PEABODY COAL COMPANY

Subsidiary of Kennecott Copper Corporation

ENVIRONMENTAL QUALITY DEPARTMENT

301 N. Memorial Drive St. Louis, Missouri 63102

## TRACE ELEMENTS IN DEER CREEK COAL

We now have analytical information on samples of coal from our Deer Creek Mine located in Emery County, Utah. This coal is from the Blind Canyon Seam. The analytical determinations regarding mercury, fluorine and chromates are tabulated below:

| | Date Sampled | Ledgemont Laboratory | Illinois Geological Survey (Mercury Only) | Bituminous Coal Research (Mercury Only) |
|---|---|---|---|---|
| | | Flameless Atomic Absorption | Neutron Activation | Flameless Atomic Absorption |
| Mercury, p.p.b. (Note ppbillion) | (a) | 50 | 40 | 90 |
| | (b) | 35 | -- | -- |

THE FOLLOWING ANALYSES WERE ALL MADE BY LEDGEMONT LABORATORY

| | | Colormetric* | AAS** | Mass Spectro |
|---|---|---|---|---|
| Chromium, p.p.m. (Note ppmillion) | (a) | 26 | 20 | -- |
| | (b) | 24 | 22 | -- |

| | | Selective Ion*** | Mass Spectro**** |
|---|---|---|---|
| Fluorine, p.p.m. (Note ppmillion) | (a) | 42 | 5 |
| | (b) | 39 | 10 |

Sample (a) was collected from the track hopper at Nevada Power from October 22, 1970, through November 30, 1970, and represents 3,375 tons.

Sample (b) was collected by ASTM Standards from the stockpile at the Mine on March 13, 1971.

After compositing, sample (a) was riffled to 3 splits, one each being sent to Illinois Geological Survey, Bituminous Coal Research, and Ledgemont Laboratory. These three labs analyzed for mercury only. Ledgemont Laboratory analyzed both samples for chromium and fluorine as well as mercury.

ANALYTICAL TECHNIQUES

The Illinois Geological Survey uses a Neutron Activation technique for determination of mercury as described in their Environmental Geology Notes No. 43, entitled "Mercury Content of Illinois Coals." Their results on Black Mesa Blue Seam is identified merely as Arizona in this report. Bituminous Coal Research used a Flameless Atomic Absorption technique. Ledgemont used that and Mass Spectrometric.

Ledgemont determined fluoride content by Selective Ion and Mass Spectrometric. Chromates were determined by Colormetric Metal Analysis and Analytical Methods for Atomic (1968) absorption.

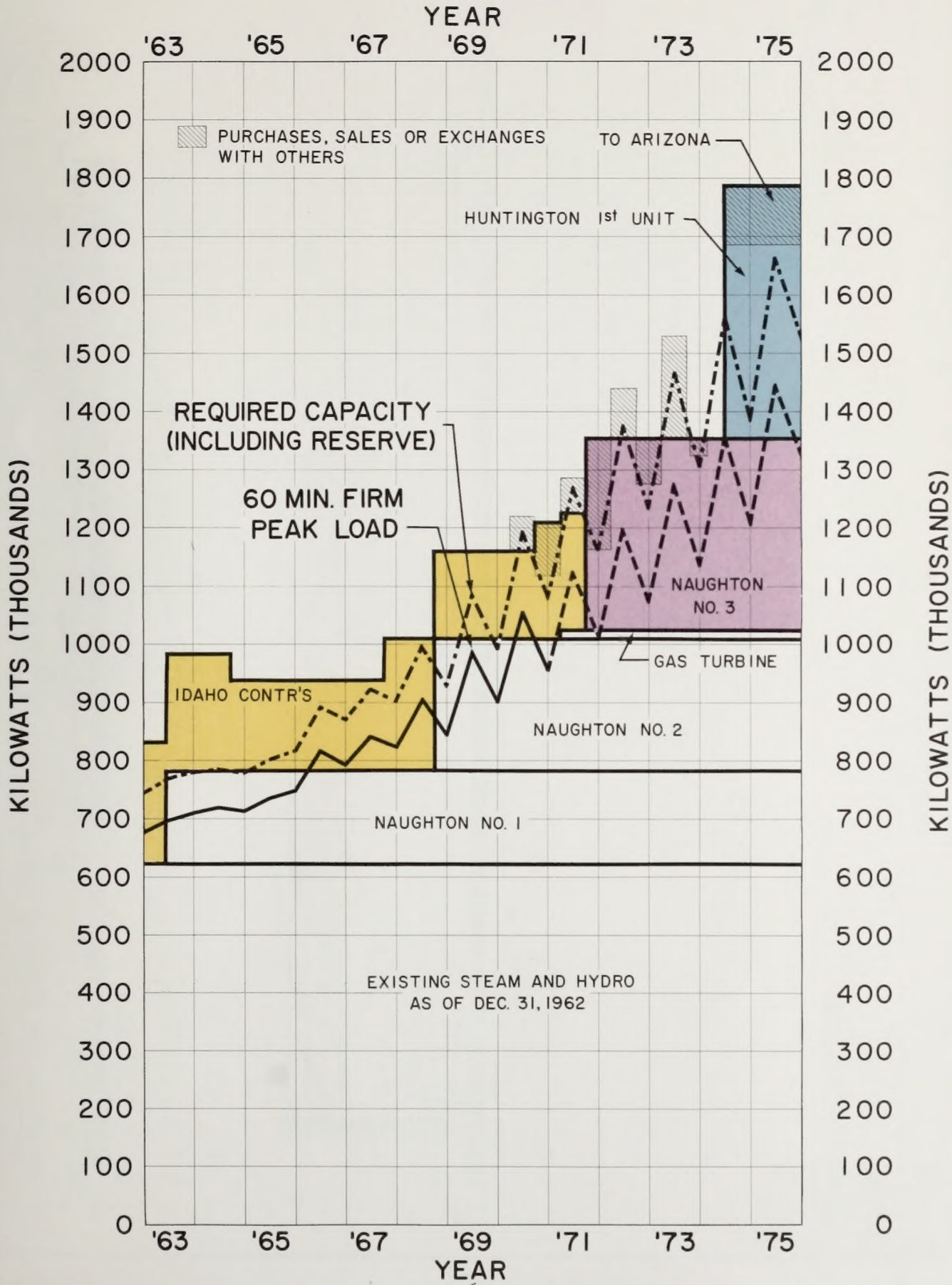
* Sample dissolution after ashing. Colormetric procedure as in E. B. Sandell, Colormetric Metal Analysis, 3rd Edition, pp 392, Part II (1959), Interscience Publishers, Inc.

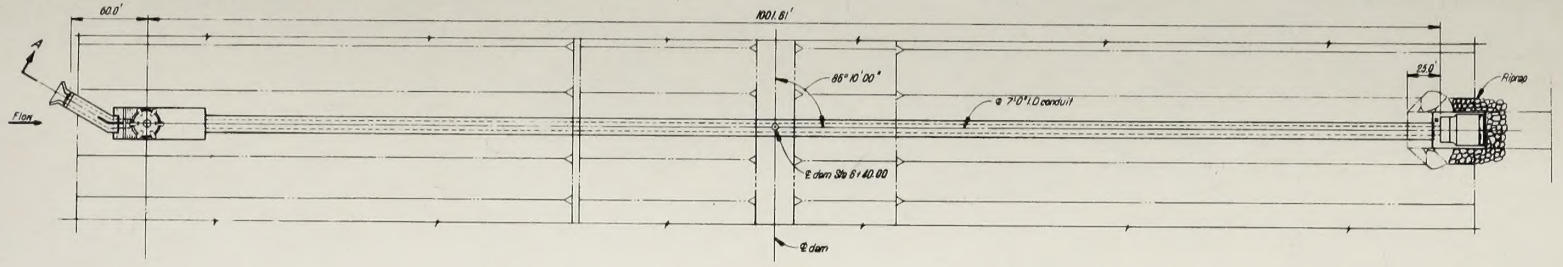
** A.A.S. procedure as in Analytical Methods for Atomic (1968) Absorption, Perkin-Elmer Corporation.

*** Sample dissolution for selective ion analysis by method of Alcoa Research Laboratory. Selective ion analysis by method of Orion Research, Application Bulletin #5.

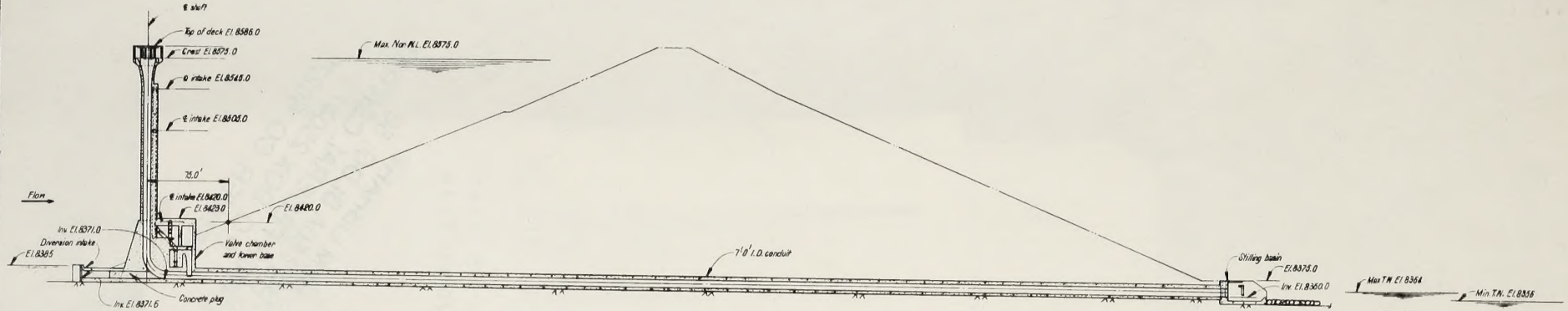
**** Mass Spectrometric data is an application of the method of T. Kessler, A. G. Sharkey, Jr., and R. A. Friedel (U. S. Bureau of Mines). This paper presented at the 19th Annual Conference on Mass Spectrometry. The method is semi-quantitative without standards.

# UTAH POWER & LIGHT COMPANY
# PEAK LOAD & PEAKING CAPABILITY






PLAN

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| DEPT. | GROUP LEADER | SECT. HEAD | DEPT. HEAD |
|---|---|---|---|
| CIVIL | | | |
| MECH. | | | |
| ELECT. | | | |
| PLAN. | | | |
| STAFF | | | CH.ENGR. |

Scale 0 40 80 Feet
1"=40'

UTAH POWER & LIGHT COMPANY
ELECTRIC LAKE DAM
EMERY COUNTY, UTAH — WATER RIGHT NO 39151
SPILLWAY & OUTLET WORKS

# GENERAL PLAN & SECTION

HARZA ENGINEERING COMPANY
APPROVED_____
CHICAGO, ILLINOIS | DATE AUGUST 1971 | DWG. NO. 566C14

| REV. NO. | DATE | NATURE OF REVISION | BY | CHKD. | APPD. |
|---|---|---|---|---|---|